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VETERINARY MEDICINE

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Lameness of the Thoroughbred

Atrophic Rhinitis and Trichomonads

Listeriosis of Cattle in South Georgia

The Clinical Use of Chloromycetin in Dogs and Cats

Polymyxin. A Study of Its Application in Equine Practice

The Veterinarian and Food Sanitation

(Complete Index on Page VIII)

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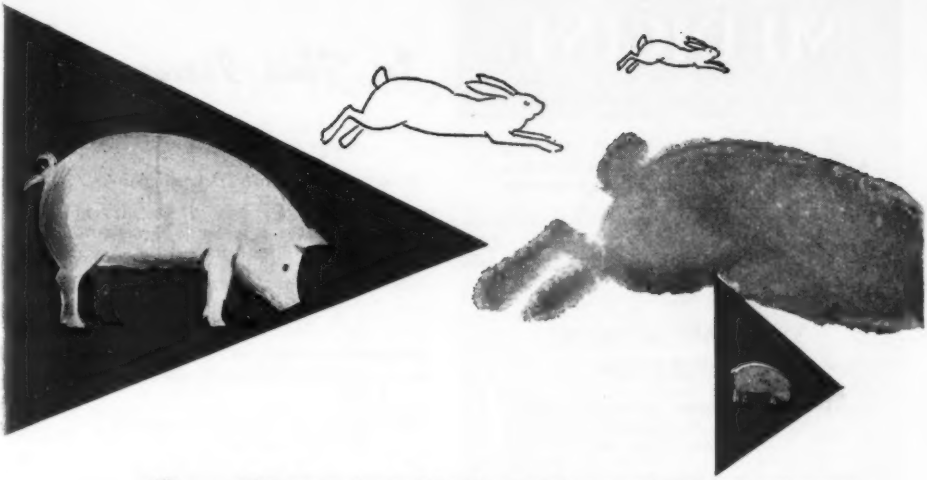

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Lameness Of The Thoroughbred

GEORGE F. BADAME, D.V.M., Toronto, Canada

IN the practice of veterinary medicine at race tracks, the practitioner is confronted with problems differing from those presented in general practice. Sound husbandry procedures, modern methods of sanitation employed, and excellent rations fed have reduced the incidence of digestive disturbances and infectious diseases to a minimum in this class of animals.

The race track veterinarian is confronted primarily with the problem of lameness, its diagnosis and treatment. The value of an incurably lame Thoroughbred depreciates to practically nothing; unless the animal is a mare or stallion and retains value for breeding purposes.

Lameness of the Thoroughbred will be discussed under the following headings; predisposing causes, exciting causes, common lameness, diagnosis, prognosis, and treatments.

Predisposing Causes

One of the chief predisposing causes of this disability is poor conformation of limbs or parts of limbs. The old proverb that, "a chain is only as strong as its weakest link", is applicable to the limbs of horses. An animal with a long sloping pastern is predisposed to strain of the flexor tendons, while one with a short straight pastern is predisposed to joint ailments; for example, ringbone, osselets and navicular arthritis. Horses with heavy bodies and small leg bones often suffer from lameness. The hoof and its various structures, such as the frog, digital cushion, and lateral cartilages, combined with the elasticity of the wall of the hoof, all tend toward expansion during locomotion and thus diminish the concussion which would otherwise be transmitted to the limb and its structures[1]. It is obvious that a very small foot would not be able to carry out the same action as a large, well-proportioned foot.

The body weight of a horse is not distributed equally over the four feet; the fore, which lie nearer the center of gravity of the body, carry a greater proportion of weight than the hind feet. This accounts for the higher incidence of fore limb anomalies[1]. In addition, the Thoroughbred carries a jockey who seats himself close to the center of gravity and thus the weight for the most part is sustained by the front legs.

All the joints of the lower thoracic limbs are limited to some extent by the action of flexion and extension;[2] therefore, it is easily seen that stepping on uneven ground or in holes where lateral or medial action is required to counteract the unevenness, would predispose joint ligaments to strain. The condition of "toeing-in" or "toeing-out" would unbalance the anticoncussion apparatus of the foot and concussion would be more evident on one side of the foot than on the other. If the horse "toed-out", the medial side would be subjected to strain; the lateral side if the animal "toed-in."

Poor shoeing will predispose horses to lameness. They should be shod every three or four weeks, depending upon how fast the hoof will grow. The best angle for the hoof and pastern, after the blacksmith has trimmed the foot down evenly, is slightly less than 50°[1]. The frog should not be touched by a blacksmith and should always be in contact with the ground. When the above "thumb" rules are not closely followed, the action of the previously mentioned anticoncussion apparatus is impaired, and lameness may occur as a result. Long toes predispose to ringbones and osselets.

The gait is a contributing factor as far as predisposition to lameness is concerned. A horse that brings its fore feet down in a pounding manner will become lame more frequently than an animal that has a smooth, gliding gait. The gait of a Thoroughbred while running has been recorded in a slow-motion film[3] which illustrates how close the fetlock comes to the ground while weight is being transferred from one leg to the other. This definitely predisposes the proximal sesamoid bones to fracture.

Most Thoroughbreds today are bred on farms which raise them for quick sale on the yearling market. In an attempt to keep expenses at a minimum, some breeders occasionally neglect the essential elements of good nutrition. Little is known about the relationship of nutrition to the etiology of various exostoses commonly seen, such as ringbones, osselets and other bone diseases. Kintner and Holt (1932) reported that the admission rate

of horses to army veterinary hospitals was much higher when animals were fed a ration low in calcium than when the ration was supplemented with this mineral element. The incidence of various types of exostoses was higher among horses on a calcium-deficient ration than among those on rations containing calcium in adequate proportions and proper balance[4].

Fig. 1. Poor conformation, a predisposing cause of lameness.

Most breeders pay little attention to conformation of a sire or dam as long as they had speed during their racing careers, and now have a record of producing early two-year-old winners.

The increase in the number of two-year-old futurities and stake races has resulted in excessive training and racing of young horses. Thoroughbreds of this age should be trained and educated, but not to excess, because they are not yet fully developed. The result of overtraining and racing two-year-olds is a high incidence of lameness among animals of this age group.

Racing of horses too often has a weakening effect and predisposes limbs to strains and resulting lameness. Elastic bandages which are applied by some horsemen for protection, cause more harm than good if not applied with even tension over the entire area. Occasionally, when these elastic bandages are removed after a race, it may be observed that a previously sound horse has a bowed tendon.

Most major race tracks today have board floors in the stalls of their stabling areas. Horses kept under these conditions do not receive the proper and natural hoof conditioning which they would obtain from standing or walking on moist earth. Unless a horse's feet are packed periodically with moist clay and unrefined kaolin (white rock), plus a suitable hoof ointment, they will dry out and lose their elasticity. With the loss of elasticity, the anti-concussion apparatus is impaired.

The indiscriminate use of iodine weakens bony structures and predisposes them to fractures. The continued use of Churchill's iodine (16%) will result in the absorption of calcium salts of the bone and leave a honey-combed stroma[5].

Predisposition to lameness is markedly influenced by the actual training that a Thoroughbred receives. A good horseman will prepare his animal for the races in a slow, systematic manner. The horse is not called upon to do anything he has not been conditioned to do. Before short workouts are attempted, long slow gallops are essential for a considerable period in order to condition muscles and tendons.

Fig. 2. Strain of the digital flexors—a common cause of lameness.

Exciting Causes

Most cases of lameness are the result of accidents in one way or another during training trials or actual competition. Some of these accidents are; misstepping, slipping, "raps", and landing on uneven ground.

A Thoroughbred must start a race from a standing position. The type of starting-gate in common use today consists of 12 standing stalls in line, with doors that swing open when the starter decides that all entries are ready. When the doors open, jockeys start whipping, and force their mounts for about an eighth of a mile before permitting them to settle into stride. It is easily seen that a great strain must be thrown on the ligaments and tendons of the horses' legs at this time. Many cases of

lameness can be traced back, from observations made by trainers and jockeys, to this part of the race.

At the start of a race, there is always much crowding because all jockeys are trying to get the best possible positions. As a result, accidents often occur. One horse may step on another's leg, while others may step on stones or in holes on "cuppy" tracks, resulting in various types of lameness.

Occasionally, a jockey may attempt to pass through an opening against the will of a rival; in this case, his competitor may crowd over and he will have to pull his mount up abruptly. Since this puts great strain on the horse's legs, the animal may become lame.

Exercise-boys frequently receive orders from trainers to keep their mounts from going too fast in morning trials. Some horses can be taken just as quickly or as slowly as the boy desires, while others "fight for their heads" and are difficult to gait. The exercise-boy, if abiding by the trainer's orders, must "swing" the

Fig. 3. Exostosis of the carpal joint. Lameness was inapparent after treatment by actual cautery and adequate rest.

horse, that is, take his head from side to side in order to prevent him from going too quickly. This interferes with the stride, and the animal may "rap" one leg with another and pull up lame.

Some jockeys injure their mounts by pulling them up too abruptly after a race or workout. Judges and stewards watch for this, and fine and discipline any boy who is guilty of such a practice.

Muddy tracks are a menace if the trainer does not take precautions on the morning of the race by having the animal fitted with mud calkins. Without these calkins, the horse will slide when running and may end up with an injury. The trainer is not always to blame for the absence of calkins, because it sometimes starts to rain just before the race, leaving no time to fit the horse with them.

Hard race tracks add to the degree of concussion which a leg may receive. This is proved by the fact that there is a higher incidence of lameness on hard tracks than on tracks with a "cushion" surface. Some leg ailments develop very slowly and lameness is not evinced for some time, while others come on suddenly and lameness is shown at the time of injury.

Over-extension of the fetlock joint is a common cause of this disability. The suspensory apparatus prevents over-extension of this joint, but if great extension is forced, it will strain or rupture.

If, as occasionally happens, a blacksmith accidentally drives a nail into the sensitive lamina of the hoof, severe limping may result.

Common Lamenesses

Tendinitis or Tenosynovitis. Of all the lamenesses seen in Thoroughbreds, tendinitis or tenosynovitis of the flexor tendons of the fore limb is probably the most common. This condition, often referred to by horsemen as "bowed tendon", may be acute or chronic. It may occur on any part of the tendon from the carpus to the fetlock. As a rule, the lower the region affected by tendinitis, the graver the prognosis. The superficial digital flexor tendon is involved most frequently. When the deep digital flexor is affected, a more serious lameness follows.

Fig. 4. Exostoses of the metacarpophalangeal articulation, a common ailment of Thoroughbreds. These are referred to as osselets by horsemen.

The affected tendon bulges posteriorly, is enlarged and sensitive. If the diagnostician stands at a 90° angle to the lateral side of the

leg, a curve will be observed in this region. Normally, the tendons are vertical and straight. The bulge may be anywhere between the carpus and fetlock or may involve the entire tendon.

Sprain of the Suspensory Ligament. As described previously, the function of the suspensory ligament is to prevent over-extension of the fetlock, or in other words, to support it. Disability caused by a sprain of this ligament unfortunately is observed too often. The sprain usually occurs at the bifurcation of the ligament on the medial side.

The injury may occur spontaneously in a race or may develop slowly. If it develops slowly, a small swelling will be observed at the bifurcation or near the attachment of the ligament to the proximal sesamoid bones. In such cases, the animal does not become lame until the swelling is quite large. In cases which occur spontaneously, the leg is swollen and the horse is lame on the affected limb. In these cases, the side or sides involved appear flat and the grooves which are normally seen on both sides of the ligament are absent. When palpated, these flat areas are hard.

Fractures. Various types of fractures occur, and most are serious. In some cases, they are serious enough to warrant destruction of the horse. The following bones usually are affected in the order named: (a) proximal sesamoid bones, (b) carpal bones, (c) phalanges, (d) metacarpal bones.

Exostoses. Exostoses are quite common in Thoroughbreds. Of these, osselets or exostoses of the fetlock joint are most common. Few diagnostic symptoms are exhibited early, but later, an enlargement which may be anterior, medial or lateral occurs on the fetlock joint and may extend down the pastern. Occasionally, all that is seen is a "proud" appearance of the joint before the enlargement appears.

Exostoses of the carpus are frequently observed and usually start as a carpitis. Any one of the three carpal joints may be involved; the carpometacarpal articulation is usually affected.

Splints are exostoses of the small and large metacarpal bones. They commence as a rupture of the interosseous ligaments between the two bones. These are serious in direct proportion to their proximity to the carpus. Lameness persists until the exostosis unites the two bones.

Ringbones or exostoses of the interphalangeal joints are the last to be mentioned here. They are referred to as low and high ringbones depending on which interphalangeal joint is involved. The horse does not "warm out" of this type of lameness. Until the exostosis appears, there is nothing upon which a diagnosis may be based except the gait, which consists of a long forward stride and a short backward stride. Lameness continues until ankylosis of the joint prevents painful movement.

Sesamoiditis. Sesamoiditis is a serious inflammation affecting the proximal sesamoid bones; rather frequently observed in racing Thoroughbreds. Affected horses must be taken out of training, rested and treated early. In some instances, a distention of the sesamoidean sheath with synovia is observed even before lameness occurs. This sheath is distended in the groove between the suspensory ligament and the deep flexor tendon just dorsal to the fetlock joint, and is referred to as a "windgall." The fetlock is hot and painful. The further the horse is jogged, the more evident the lameness becomes.

Inflammation of the Joint Capsule of the Metacarpophalangeal Articulation. This is manifested by swelling just above the fetlock in the groove between the suspensory ligament and the metacarpus. The affected animal usually becomes lame but, in some cases, not until enlargement of the joint capsule has persisted for some time.

Diagnosis

It must be kept in mind that, before a quick and efficient treatment of a lameness can be instituted, a correct diagnosis must be established.

Diagnosis requires keen powers of observation by the diagnostician, an excellent knowledge of anatomy, and a thorough understanding of the physiology of locomotion. Before any diagnostic aids can be utilized, the practitioner must limit the tentative diagnosis to the particular limb affected and, if possible, to the region of the limb concerned.

First, the conformation of the horse should be observed, to pick out weak anatomical points. History of the case is important because it may provide the missing fact which will assist in arriving at a correct diagnosis.

Age of the animal also should be taken into consideration. For instance, one may see a metacarpal periostitis in a two-year-old, while such an inflammatory process is rarely observed in aged horses.

The acuteness of a lameness may suggest a fracture; a soreness, more likely a chronic condition.

Diagnostic Aids

Nerve-blocking. This is used as a method of diagnosis, but has many limitations. It is a method whereby a sensory nerve is blocked off by injecting a local anesthetic solution (4% procaine), after which the animal is jogged or trotted. After 15 minutes it may be possible to perceive if the lameness improves or ceases. Its best application is in the diagnosis of navicular arthritis when the posterior branches of the metacarpal nerves are blocked.

X-ray. An *x*-ray machine is practically indispensable in diagnosis. It serves its greatest

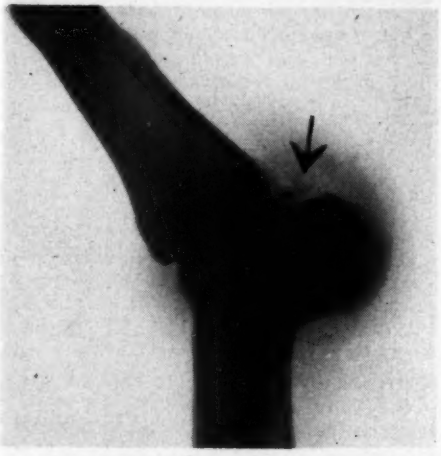

Fig. 5. Reproduction of *x*-ray plate showing fracture of proximal sesamoid bone. A common cause of lameness of race horses. Prognosis is unfavorable for recovery and racing, but good if animal is intended for breeding.

purpose in the diagnosis and prognosis of fractures. The *x*-ray should never take the place of a thorough manual examination but rather should be used to supplement it. A proper roentgenographic technic, with correct interpretation of plates, is essential when using the *x*-ray as a diagnostic aid.

Manipulation. Manipulation cannot be depended upon as an aid to diagnosis of lameness in the Thoroughbred because the race horse usually flinches wherever one applies a little pressure. However, it does serve a purpose in the palpation of an enlargement or an inflammation. Manipulation also may show a bone crepitation which would suggest a fracture.

Prognosis

A complete understanding of the pathological condition causing the lameness is essential for a reliable prognosis. It must be kept in mind that a horseman racing a stable of horses appreciates a prognosis stating whether the patient will be able to return to racing competition or not, and if so, how close recovery will be to previous degree of soundness. As mentioned, an *x*-ray plate aids tremendously in giving a reasonable prognosis when fractures occur. The prognosis of exotic conditions should be guarded because the outcome depends upon the manner in which nature heals the growth. In ligament and tendon ailments, the degree of strain or damage is the best guide to the final outcome.

In many cases, where a guarded or unfavorable prognosis must be given with regard to the possibility of a horse's return to competition, owners may be assured recovery sufficient to make practical keeping such animal for breeding purposes. For example, an animal suffering a strain of the suspensory ligament or a fracture of the proximal sesamoid bones would still retain its value for breeding.

Treatment

The importance of rest cannot be overemphasized in treatment. A number of lamenesses, especially those for which a favorable prognosis has been given, would have the same outcome if they were merely rested for a long time, as would result from active treatment.

To shorten the length of time the horse must remain out of training, the practitioner must apply various therapeutic measures. At the present time, the most economical and effective treatment is through the use of counterirritation.

The region of the limb most often affected is from the carpus to the hoof. In this area of tendons and ligaments in which blood supply is limited, healing processes are slow.

Counterirritation produces an increased blood supply to any area, which results in an increased nutrition of the part, and effectually aids nature in overcoming various pathological processes[6].

Beneficial effects of this treatment are believed to be due to its action in modifying the nutrition of the part promoting absorption of exudates, and so favoring resolution[7].

Various methods of producing counterirritation are as follows: (a) application of drugs, for example, blisters and liniments; (b) application of the actual cautery; and (c) diathermy.

Firing and blistering both produce counterirritation by direct and severe irritation which persists. Diathermy treatment, on the other hand, acts by changing the temperature of the part to which it is applied, thus increasing the supply of blood to the area. The effect of the

diathermy treatment does not persist and therefore the treatment must be repeated.

Various drugs used as counterirritants include red iodide of mercury, cantharides, croton oil, iodine, turpentine, and various others.

For application of the actual cautery an ether or electric cautery is used.

Diathermy is being used extensively as a therapeutic agent by practitioners in the United States. It is a popular mode of treatment in human medicine. The therapeutic use of the diathermy methods consist of the application of currents of low tension and high amperage which produce warmth in the deeper structures of the region treated. When an electrical current flows through a conductor it has to overcome a certain resistance, which varies according to the nature of the conductor. In overcoming this resistance, heat is produced, its amount depending upon the strength of the current and the resistance of the conductor. Diathermy apparatus is merely equipment designed to produce, continuously, currents of the necessary intensity, alternating with sufficient rapidity not to be fatal. This method of therapy is said to increase local circulation from 200 to 300 times[6].

Since the diathermy apparatus is expensive and treatments must be repeated frequently, it is only employed on the most valuable animals.

Application of the actual cautery is about the most popular method of applying severe counterirritation today because of its economy and effectiveness.

Such radical treatment is contraindicated in acute inflammatory conditions. A method which may be used for acute inflammation is the application of cold water until such inflammation subsides. Applied externally, cold water is a refrigerant, and exerts tonic and astringent effects on the parts to which it is applied. It causes contraction of the blood vessels, and decreases the supply of blood to the part. Since counterirritation is contraindicated in the treatment of an acute inflammation, the application of cold water before firing or blistering is indicated and is followed by excellent results as shown by clinical experience[7].

A Possible Routine Treatment of the Future

In human medicine, according to Thom,[8] irradiation is the method of choice in the treatment of bursitis, peritendinitis, arthritis, and tenosynovitis. With the exception of fractures, most lamenesses of horses are caused by one of the above conditions. The theory of radiation therapy is as follows: The weight of clinical and experimental evidence indicates that the first and major effect of the rays is the destruction of some of the infiltrating

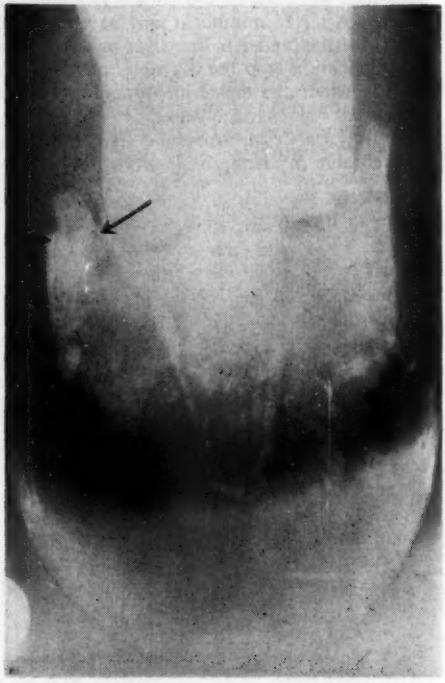

Fig. 6. Separation of the lateral posterior process of the third phalanx with displacement of the separated fragment toward the joint. No callus is evident at fracture site.

leukocytes, especially the lymphocytes, which have long been known to be the most radiosensitive of all cells. Moreover, the destruction of the infiltrating lymphocytes which occurs, or at least begins, soon after irradiation, probably serves to liberate the antibodies, ferments and other protective substances contained by those cells, and to make these substances more available for defense than they were in the intact cells. The destruction of infiltrating leukocytes tends to increase phagocytosis.

In favor of this view is the fact that the rate of improvement, including relief from pain, which follows irradiation of acute inflammatory lesions, agrees closely with the rate of leukocytic destruction induced in animals and human beings by experimental exposure to roentgen rays. Another significant fact is that favorable results require only small doses;

doses too small to have an appreciable effect on other cells. One of the physiological changes which occurs after irradiation is the reduction of hyperplastic tissue. Another striking effect of radiation therapy is the prompt absorption of calcareous deposits.

As for the application of diathermy in horse practice, if this method of treatment would give the same results as does firing it would be preferable, because of the absence of pain after the treatment.

Since lameness is one of the major problems confronting the Thoroughbred industry today, it surely warrants further and more exacting investigation and research by the veterinary profession. The practice of preventive medicine concerned in lameness should be stressed by the practitioner engaged in treating race horses.

Conclusions

Two-year-old Thoroughbreds should be trained and raced lightly.

In selecting animals for breeding, particular attention should be given to conformation of the sire and dam, as well as past performances and pedigree.

Scientific shoeing should be practiced at all times.

The necessity of a correct diagnosis cannot be overemphasized.

There is no substitute for keen observations and a thorough examination in the diagnosis of lameness.

Diagnostic aids should supplement the manual examination where possible.

Rest should be considered first and foremost in the treatment of lameness.

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Luxation of the Hock Joint in a Cow

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The writer was called to examine a cow that was down with one leg in extreme flexion. The cow had been turned into the rough and rocky pasture where found that morning.

Symptoms

The left hind limb was in extreme flexion. The owner said the animal was up on three legs when he found her but went down when he tried to move her toward the barn. Upon palpation the cow showed extreme pain at the hock. The muscles of the entire leg were very tense and hard. No other abnormalities were found. The leg could not be straightened.

Treatment

The farmer held the stifle joint in a fixed position. The writer grasped the hoof which was flexed, in one hand and the point of the hock in the other hand. Holding the hock in a fixed position, the hoof was pushed upward and the leg twisted into a sharp arc medially and the hoof rotated at the same time.

A loud noise was heard and the tarsal bones were felt to crepitate. The leg immediately relaxed. The patient then got up and limped to the barn. The cow was kept in a small pasture and in about three weeks complete recovery occurred.

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Livestock Parasites in 1879

Parasitic diseases of animals have an importance that cannot be ignored. It has been shown that 8% of hogs killed in Chicago are trichinous; that lungworms have killed lambs by the 100,000 in single counties in Iowa, Ohio, Illinois, and elsewhere; that much of the so-called hog cholera in different states is but the ravages of lungworms; that even scab temporarily ruined the wool-growing industry not long ago in Iowa and still ravages certain other states; and that intestinal worms have been equally destructive in other directions.—*James Law, F.R.C.V.S., National Live Stock* [sic] *Journal, January 1880.*

Atrophic Rhinitis And Trichomonads*

W. P. SWITZER, D.V.M., M.S., Ames, Iowa

IN recent years, atrophic rhinitis of swine has been diagnosed with increasing frequency in Iowa where it has caused extensive loss in many herds. The etiological agents responsible for this disease remain unknown.

During necropsy of swine affected with this condition, numerous fresh smears of the nasal mucosa were examined by the author and other members of the Iowa Veterinary Diagnostic Laboratory staff and were found to contain trichomonads. No previous report of the occurrence of these organisms in the nasal cavity of swine was found in any of the literature that was reviewed. In view of this, the following four-point investigation was initiated. (1) The determination of the incidence of these nasal trichomonads in Iowa swine affected with atrophic rhinitis. (2) The propagation of the nasal trichomonad in bacteria-free and yeast-free cultures. (3) A study of the morphology of this protozoon. (4) The establishment of certain host relationships in available experimental animals.

A brief review of the literature concerning *Trichomonas suis*, the only recognized species of swine trichomonad, is presented since no adequate compilation of information concerning this protozoon is available.

Review of Literature

Gruby and Delafond[1,2] vaguely described a protozoon occurring in the gastric contents of a pig. Davaine[3] reviewed their description and decided that this organism was a Trichomonas and should have the species name of *suis*. Kunstler[4] also mentioned the presence of trichomonads in the intestinal tracts of swine and in the vaginae of cattle.

In 1910, Brumpt[5] noted that the ceca of swine contained large numbers of these protozoa. Some swine affected with necrotic enteritis were observed by Dimock[6,7,8,9] to harbor *T. suis* in their intestinal tracts. On this basis he assumed they were one of the causes of this disease. However, less than 50% of the cases of necrotic enteritis of swine studied by Murray, *et al.*,[10,11] showed the presence of

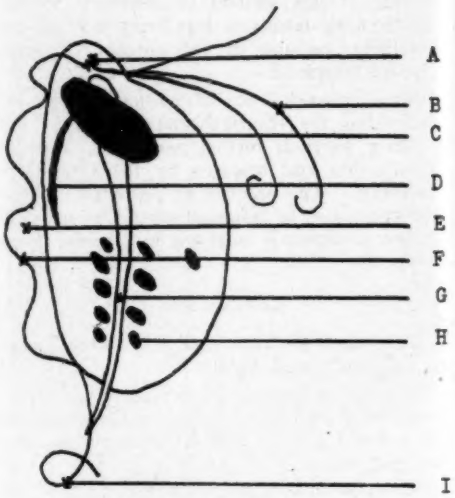

Fig. 1. Diagrammatic outline of a nasal trichomonad. (A) Granular blepharoplast. (B) Anterior flagella. (C) Granular nucleus. (D) Costa. (E) Undulating membrane. (F) Marginal filament. (G) Axostyles. (H) Food granules. (I) Posterior or trailing flagellum.

T. suis. In a study of the intestinal protozoa of swine, Kessel[12] found that 11 out of 23 Chinese market pigs examined were infected with trichomonads. Those present in the large intestine of eight of these pigs possessed three anterior flagella, while those in the large intestine of the remaining three pigs possessed four. Fry and Meleney[13] reported 47 of 63 swine they examined harbored intestinal trichomonads. The only worker to report the occurrence of a trichomonad in the vaginal tracts of swine and in aborted fetuses was Küst[14]. The protozoa observed in this case were said to resemble *T. foetus* of cattle. In an attempt to evaluate this observation, McNutt, *et al.*,[15] examined the vaginae of 289 swine at an Iowa abattoir and found no trichomonads present in any of the specimens. Trussell and McNutt[16] failed to establish cultures of bacteria-free *Trichomonas vaginalis* and *T. foetus* in the vaginae of swine. A very brief discussion of *T. suis* was presented by Morgan and Hawkins[17] who described it as being 8 to 10 microns in length with three

*Material presented is abstracted from a thesis submitted by the author in partial fulfillment of the requirements for the degree of Master of Science at Iowa State College, Ames.

anterior flagella, an undulating membrane and a slender axostyle. Hegner and Alicata[18] found large numbers of trichomonads in a granulomatous facial lesion of a pig that was raised in the swine herd at the University of Hawaii. The average measurement of ten representative iron-hematoxylin stained organisms from this lesion was reported as 10.3 by 5.6 microns.

Incidence Determination

The incidence of the nasal trichomonad was ascertained by the examination of scrapings that were collected from the nasal turbinate mucosa and from the lateral walls of the nasal cavities of swine that had been dead only a few minutes. These scrapings were suspended in a drop of either tap water, 0.85% sodium chloride (NaCl) solution, or modified Ringer's solution, although the latter was the preferred diluent, and a few seconds after preparation they were examined at 100 magnifications for the presence of motile protozoa.

It was found that 70 out of 87 (80%) swine affected with atrophic rhinitis harbored a *Trichomonas sp.* in the nasal cavity. By comparison, from only two out of 72 (2.8%) diseased Iowa swine not affected with this anomaly were the organisms demonstrable. One of these two was from a herd known to be affected with atrophic rhinitis. Considerable difference was observed to exist in the numbers of trichomonads present; the early stages of atrophic rhinitis usually yielded the greatest number, while the more advanced cases usually contained few protozoa. In some scrapings as many as ten or 12 organisms were present in a single field (x100). On the other hand, a search of some specimens failed to reveal more than two bodies in the entire preparation.

The cecal contents of 47 out of 64 (74%) of the pigs affected with atrophic rhinitis were positive for *T. suis*, while 28 of 48 (62%) pigs not affected harbored this species in their ceca.

Cultivation Procedure

The nasal trichomonad and *T. suis* were cultivated in the C.P.L.M. medium described by Johnson[19]. Plasma collected from citrated equine or bovine blood was satisfactorily substituted for the human serum called for in the original C.P.L.M. medium. With the exception of this change, the procedure used to prepare this medium was very similar to that described by Trussell[20].

The trichomonad cultures were incubated at 37 C. and transferred daily or incubated at room temperature and transferred every six days. The room temperature cultures failed to produce as dense a protozoal population as cultures incubated 36 hours at 37 C., which would occasionally attain a peak population of 3,500,000 per cc. A bacteria-free culture of the nasal trichomonad and of *T. suis* was secured by the addition of 50,000 units of crystalline penicillin G and 50 mg. of crystalline streptomycin to a series of tubes of medium at the time of inoculation. The use of U-shaped migration tubes allowed yeast-free cultures to be obtained. Both the nasal trichomonad and *T. suis* produced a small quantity of gas, the exact composition of which was not determined. This observation paralleled that of Trussell[20] who observed that bacteria-free cultures of *T. vaginalis* also produced a slight amount of gas. It was found possible to adapt both the nasal trichomonad and *T. suis* to avian embryos by inoculation of 1 cc. of a C.P.L.M. medium culture into a five-day embryo, harvesting the chorioallantoic fluid from the egg six days later and reinoculating C.P.L.M. medium. After six alternate transfers the trichomonad cultures became pathogenic for the embryo, killing them in approximately three days. The protozoa remained viable in the eggs for several days after the death of the embryo.

Morphological Studies

Morphological studies of the nasal trichomonad were based on observation of bright-field, dark-field and phase-contrasted preparations as well as Giemsa's and iron-hematoxylin stained individuals.

The average measurement of 60 Giemsa's stained nasal trichomonads from a 48-hour C.P.L.M. culture was 15.3 by 5.3 microns. Examination of 100 well-preserved Giemsa's stained specimens disclosed that 97 had three, two had two and one had four anterior flagella. These nasal trichomonads had no distinct cytosome. An undulating membrane extended along the dorsal margin of the protozoa from two-thirds to approximately the length of the body and usually exhibited from three to five undulations. The marginal filament of this undulating membrane was continued as a posterior or trailing flagellum from 8 to 10 microns in length. A well-developed axostyle with a slightly bulbous anterior portion was present. The diffusely granular, oval shaped nucleus was usually located in the anterior portion of the cytoplasm in dorsal apposition to the axostyle.

Host-range Determination

Four 36-hour-old pigs were inoculated intranasally with a nasal trichomonad culture. They exhibited no respiratory symptoms during the eight week observation period, and no significant nasal lesions were present upon necropsy. Nasal trichomonads were not present, although three of the pigs harbored cecal trichomonads.

A young, trichomonad-free, non-pregnant Jersey cow was inoculated intravaginally with a culture of the nasal trichomonad. Inspection of the vagina six days after inoculation revealed the presence of a mild catarrhal vaginitis associated with numerous trichomonads. This cow maintained a demonstrable intravaginal population of these protozoa for three weeks. Vaginal washings collected at the end of the fourth week were negative. A second young, trichomonad-free, non-pregnant Jersey cow was inoculated intravaginally with a culture of *T. suis*. Inspection of the vagina five days after inoculation revealed the presence of a mild catarrhal vaginitis associated with numerous trichomonads. Vaginal washings prepared on the 12th, 18th, 33rd, 43rd, 74th and 92nd days after inoculation contained the protozoa. No attempt was made to ascertain the effects of the nasal trichomonad or the *T. suis* infection upon the fertility of the cows.

Discussion

The present work is apparently the first report of the occurrence of a trichomonad in the nasal cavities of swine. Sixteen of the pigs with nasal trichomonads had no *T. suis* present in the digestive tract, indicating that the nasal protozoon is probably established by the transfer of infective material to the nasal cavity by an external route and not by anterior migration.

Bacteria-free and yeast-free cultures of the nasal trichomonad and of *T. suis* were successfully propagated in C.P.L.M. medium. The protozoa were most abundant near the bottom of the culture, although some were present in all but the uppermost portion of the medium. Anaerobic cultivation exerted little effect upon the peak populations. When declining populations were examined, some of the organisms exhibited peculiar characteristics such as stalk-like prolongations that contained the anterior flagella and the undulating membrane; also amoeboid motions of the cytoplasm were observed. Quiescent forms were observed to touch the terminal portion of their axostyle to objects and to remain attached by a thin mucilaginous strand that served to anchor them against slight movements. Division in both *T. suis* and the nasal trichomonad was by binary fission, although all stages of the division process were not seen.

After 200 transfers, cultures of each species became indistinguishable in size, cytoplasmic outline, abundance of food granules and type of motility. A comparison of Giemsa's stained individuals from cultures of *T. suis* and from cultures of the nasal trichomonad, after having been maintained for over 200 transfers in C.P.L.M. medium, failed to reveal any significant morphological differences, indicating that those present in the nasal cavities of 70 of 87 (80%) atrophic rhinitis swine examined in the present work may be derived from *T. suis*.

Fig. 2. Giemsa's stained nasal trichomonad from a C.P.L.M. culture. x800.

The failure of the cultures of the nasal trichomonad to become established in inoculated pigs made it impossible to determine its action upon the nasal epithelium. Hogue[21,22] has shown that both *T. foetus* and *T. vaginalis* produce a toxin capable of damaging tissue cultures of epithelial cells. It remains to be determined if the nasal trichomonads likewise produces a toxin capable of damaging the nasal structure of the host animal. The results of this pig inoculation trial suggest that this protozoa probably requires a mild rhinitis for its successful establishment in the nasal cavity.

Conclusions

1. The nasal cavities of 70 out of 87 (80%) Iowa swine affected with atrophic rhinitis harbored trichomonads, whereas only two out of 72 (2.8%) diseased Iowa swine not affected with atrophic rhinitis were positive.

2. The cecal contents of 75 out of 109 (69%) pigs contained *Trichomonas suis*.

3. Bacteria-free and yeast-free cultures of the nasal trichomonad and of *T. suis* were successfully propagated in C.P.L.M. medium.

4. After continued cultivation the morphology of the nasal trichomonad and *T. suis* became similar.

5. A culture of the nasal trichomonad failed to produce atrophic rhinitis when inoculated intranasally in four 36-hour-old pigs.

6. *T. suis* and the nasal trichomonad can establish themselves in the vagina of cows where they elicit a mild catarrhal vaginitis.

7. Additional investigations should be conducted to determine the pathogenic potentialities of *T. suis* and of the nasal trichomonad.

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Horsefly Control with Activated Pyrethrins

A simple, self-operating chute for spraying dairy cattle has been developed by the Illinois Natural History Survey, Urbana, Ill., from which complete plans and details may be obtained on request. It is said to be especially useful for dairy cattle and may even be employed satisfactorily for prevention of attacks by horseflies. Pyrethrins with piperonyl butoxide (such as found in pyrenone T-143) are active against these flies but the period of protection is short. Consequently, the spraying chute is located where cattle easily can be walked through it about twice a week. Illinois dairymen who sprayed regularly last summer are said to have gotten 10 to 25% more butterfat, at a cost of about 10 cents per cow per week.—A.O.F.

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Phenothiazine and Lead Arsenate

A communication from British Guiana* states that good results were obtained in goats from the combined use of wettable phenothiazine and lead arsenate. The drugs were mixed in the proportion of 10:1 by weight, and administered as a drench against stomach worms, nodular worms, and tapeworms. The dosage of lead arsenate ranged from 0.1 gm. for month-old animals to 1.5 gm. for adults; presumably, the phenothiazine dosage varied from 1 to 15 gm. There were no injurious effects, and the medication was regarded as eminently beneficial clinically. Of further interest is the reported earlier practice of dosing alternately with phenothiazine and lead arsenate at six-week intervals.

However promising, these methods of treatment cannot be recommended. The report is deficient in critical details and the dosages are not those commonly used. Moreover, lead arsenate, although the best available treatment against tapeworms, should properly be regarded as experimental.—A.O.F.

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Listeriosis Of Cattle In South Georgia

CLYDE I. BOYER, JR.,* V.M.D., WILLIAM L. SIPPEL,* B.S., V.M.D., M.S., and B. E. CARLISLE,** D.V.M.

LISTERIOSIS in ruminants has been reported a number of times in the literature during the past 20 years. However, to the best knowledge of the authors the disease has not been reported and diagnosis confirmed by isolation and identification of the causative organism in Georgia. It is the purpose of this report to give a brief review of the literature and to describe this case found in south Georgia.

Listeriosis is defined as an acute, specific, infectious, bacterial encephalitis of sheep, cattle, goats, horses, swine, chickens and dogs, among the domestic animals, and in addition, in some forms of wild life and man. The term listeriosis is used in place of the more familiar term, listerellosis, because it is so listed in the 6th (1948) edition of Bergey's Manual of Determinative Bacteriology[1]. The genus name is now Listeria; named for Joseph Lister, the English surgeon and bacteriologist.

The disease has been reported from New Zealand, Australia, England, Scandinavia, and from the states of California, Colorado, Connecticut, Illinois, Indiana, Iowa, Michigan, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Wisconsin, and possibly others.

Pathogenesis

This disease is caused by *Listeria monocytogenes*, a small pleomorphic Gram-positive rod that grows readily on most of the ordinary culture media. The organism grows well on blood agar plates producing in 18 to 24 hours small colonies, surrounded by a narrow zone of hemolysis.

Olafson[2] states that: "Practically nothing is known about the natural habitat or distribution of the organism when not in the nervous tissue. On farms where outbreaks occur year after year, one wonders whether some of the animals are carriers and where the organism may be harbored. The disease may appear suddenly on a farm where it has not occurred before even though no new animals have been added. This organism has been isolated from rodents, which suggests the possibility that rats may harbor the infection and carry it to sheep.

"The route by which the organism enters the brain has not been definitely determined. The fact that intravenous inoculations ordinarily do not produce encephalitis is evidence against the hematogenous route of infection.

"From our studies, it appears that the disease starts as a rhinitis. In affected flocks the organisms probably get into the nasal passages of most animals but only in exceptional cases is the invasion deep, extensive and progressing to the brain."

It is possible that the condition in cattle may develop along similar lines. Other investigators have suggested the possibility of the disease starting as a conjunctivitis in cattle.

Symptoms

Olafson[2] gives the symptoms as follows: "A cow may show difficulty in finding its stanchion or in getting through a door. Later, the animal pushes against the wall or may lean against a post for hours. On the second or third day, the tendency to circle appears. Circling may be either to the right or left, but an individual case circles in only one direction. Drooping of one ear and some degree of facial paralysis appear. Testing the tone of the lips by lifting them away from the gums often enables one to detect unilateral paralysis. Lack of tone or partial paralysis of an eyelid may be present. The muscles of the neck tend to pull the head to one side. If the neck is forcibly straightened, the head tends to fly back to the original position when released. An animal may carry a wad of hay in the cheek for two or three days. An occasional case shows excitement. About the third or fourth day, the animal has difficulty in keeping on its feet, falls down, and cannot get up. Later the patient lies flat on its side and may show rowing movements. The disease lasts from three to seven days."

Pounden, *et al.*,[3] give an interesting account of an unusual acute outbreak in cattle in Ohio. This was in three-month-old calves in which: "The first noticeable sign observed in any of the calves was a slight dullness. Within an hour they would bellow as though in severe pain,

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**Practitioner, Camilla, Ga.

turn around, fall to the ground, go into convulsions, and die within a few minutes. Almost every calf in the group was noticed to have mild conjunctivitis on the last day that deaths occurred."

Diagnosis: Clinical, Differential, Laboratory

Listeriosis should be suspected in animals showing symptoms of an encephalitis marked by dullness, circling, and facial paralysis. It should be emphasized that there are no specific diagnostic symptoms, those that are seen are referable to encephalitis. The differential diagnosis should take into consideration those conditions which may produce similar symptoms. Jensen and Mackey[4] mention the following: "Abscesses of the brain in both sheep and cattle produce symptoms resembling listerellosis. Abscesses are usually chronic and nonfebrile and are identifiable at autopsy. Spondylitis in cattle, caused by *Actinomyces necrophorus*, is common in Colorado. Such animals first show posterior incoordination and coma in advanced stages. These are easily diagnosed at autopsy. Malignant catarrhal fever may resemble listerellosis superficially. In this disease, the temperature reaches 106 F. and above. Commonly the animal is aggressive. Keratitis, rhinitis and stomatitis are common.

"Forage poisoning in feed lot cattle is characterized by blindness, pushing, prostration and coma. However, it is non-febrile and autopsy often shows hemorrhage and softening in the thalami."

A positive diagnosis must rely on the laboratory for isolation and identification of the causative organism; its recovery following inoculation into suitable experimental animals such as the rabbit; and by the histological changes in the nervous tissues.

Schwarte and Biester[5] mention that: "Agglutination reactions in cattle serum are so variable and inconsistent that they cannot be depended upon as a routine laboratory procedure."

Due to a high percentage of monocytes in the differential blood smears of some affected laboratory animals, such as rabbits and mice, the species name monocytogenes was given to the causative agent. However, monocytosis is not a characteristic of the disease in cattle.

Postmortem Lesions

According to Schwarte and Biester[6]: "Generalized gross lesions which are observed in human beings, chickens and rodents usually are absent in infected cattle, sheep and swine." The visible postmortem lesions of one of their cattle cases consisted of: "a slight congestion with mild petechiation in the cerebellum and medulla. There was also a slight softening apparent in the medulla and spinal cord."

In the unusual outbreak of acute bovine listeriosis reported by Pounden, *et al.*,[3]: "The lesions noted at autopsy of three of the first six calves to die were petechial and ecchymotic hemorrhages in heart tissues, especially the pericardium and epicardium. Visible liver changes were practically absent. Petechial and

Symptoms of listeriosis in cattle are those suggesting encephalitis, and include dullness, circling movement, and facial paralysis.

ecchymotic hemorrhages varying from 1 to 5 mm. in diameter were scattered throughout the kidneys. Those calves which died later showed these same lesions and also marked hyperemia and edema of the anterior half of the lungs."

Histologic examinations by Schwarte and Biester[6] of brain tissue of their cattle cases revealed: "Perivascular and focal areas of infiltration consisting of accumulations of monocytes and polynuclear leukocytes in the cerebellum."

Treatment

No effective specific treatment has yet been reported. Gray and co-workers[9] report that results of *in vitro* and *in vivo* tests with rabbits, carried out to determine the effect of streptomycin on *Listeria monocytogenes* suggest that the organisms rapidly develop a fastness for the drug. Sulfanilamide, sulfapyridine and sodium sulfadiazine with penicillin and penicillin alone have been tried without much success.

Recent tests[10] on the use of antibiotics against this organism have shown that aureomycin may be of some use in treatment. The *in vivo* activity of aureomycin and penicillin was tested in mice. Thirty 20-gm. mice were infected intraperitoneally with 0.5 ml. of 1:10 dilution of an 18-hour tryptose-phosphate broth culture. Treatment was begun 30 min-

utes after infection, using the subcutaneous route. Treatment was given on four successive days, once daily. The dosage was 10 and 5 mg. per kg. of body weight. Both groups of aureomycin-treated mice survived without any apparent after effects. None of the penicillin-treated mice survived. Postmortem examination revealed multiple necroses in the livers and mottled spleens. Liver cultures were all positive for Listeria.

Case Report

This case was referred by Dr. B. E. Carlisle of Camilla, Ga. It was seen by him on a farm near Pelham, Ga., where he had been attending other cattle in the herd. While there, he was asked to look at a yearling that was acting rather peculiarly. It was lying with its head drawn to one side and upon getting up walked continuously in circles to the right. There was grinding of the teeth, some slobbering, nasal discharge and diarrhea. The pupils were dilated, but the animal could see well enough to avoid walking into the fence or trees. The temperature was 102.2 F., it was off feed and had lost considerable weight. No facial paralysis was seen. Recognizing the condition as one not readily diagnosed clinically, Doctor Carlisle referred the case to the authors for observation and laboratory examination.

The only visible postmortem lesion was a congestion of the vessels of the brain. Histopathological sections of the brain stem and medulla revealed perivascular and focal infiltration of monocytes, lymphocytes and polymorphonuclear cells. A portion of the brain stem was removed with sterile precautions, ground in a Tenbroek glass grinder and plated heavily on blood agar plates and in heart infusion broth.

A small, motile, pleomorphic Gram-positive rod was recovered in pure culture after 36 hours' incubation from the heart infusion broth. One of these broth tubes was streaked on a blood agar plate and it showed growth of a small hemolytic colony after 18 hours' incubation. The original blood plates never supported growth.

The organism was put in 18 different carbohydrates for biochemical reactions as given by Bergey. They were observed at 24 and 48 hours and after 15 days' incubation, the reactions were typical for *Listeria monocytogenes*. They were negative for indol and the nitrate reduction tests. One cubic centimeter of a 24-hour heart infusion broth culture was inoculated intravenously into a rabbit, which died 2½ days later. Blood samples were taken for hematologic study before inoculation and once daily afterwards until death. Postmortem examination of the rabbit revealed no grossly visible lesions other than a small amount of fluid in the pericardial sac. The heart blood, pericardial fluid, lung, liver and brain stem were cultured in heart infusion broth and blood agar plates. A small hemolytic pleomorphic Gram-positive rod was recovered in pure culture from all the above rabbit organs.

Results of the white blood counts on the inoculated rabbit were as follows: 2/16/51—before inoculation — 16,900; 2/17/51 — 24 hours after inoculation — 14,200; 2/18/51 — 48 hours after inoculation — 8,500 (22 nucleated red cells were seen); 2/19/51 — found dead.

The white blood cell differential count indicated no evidence of a monocytosis developing in this rabbit, the highest percentage and number being 5% 48 hours after inoculation. The only hematological response in the rabbit was a lowering of the total white blood count with a slight increase in neutrophils after 24 hours and a marked decrease in neutrophils after 48 hours.

Discussion

This case was not unlike other reported cases in cattle, in that no great number of animals in this herd of more than 200 were affected and there were no significant visible lesions on autopsy. No treatment was attempted in this case and it is possible that it may have recovered. Schwarte and Biester[11] mention that: "The number of cattle in a herd which are affected in an outbreak is comparatively small. The percentage of recoveries is much higher and losses are lower compared with those in other species. It is evident from our experiences with the transmission of this disease under experimental conditions that cattle are comparatively resistant to listerella infection."

When a monocytosis is used as a criterion for diagnosis of this condition it is quite possible that cases in cattle are missed. The work of many investigators has usually failed to demonstrate any significant monocytosis in cattle in either natural or experimentally infected animals.

In culturing brain material for Listeria the technic of Grey, *et al.*,[12] should be kept in mind. These authors demonstrated that three of five brain cultures which were negative on primary media inoculation were all positive after they had been refrigerated for from five

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The Clinical Use Of Chloromycetin In Dogs And Cats*

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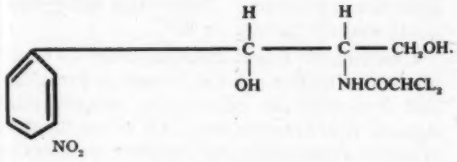
THE antibiotic, chloramphenicol (chloromycetin®), produced by fermentation from an actinomycete, *Streptomyces venezuelae*, was originally reported by Rebstock, *et al.*[1]. It is the first antibiotic for therapeutic use which can be produced on a commercial scale by either natural fermentation or chemical synthesis[2,3].

Chloromycetin is a stable product and is unaffected by boiling in distilled water for more than five hours. In water at room temperature solubility is 0.25%. It is soluble up to 15% in propylene glycol. Stability in the body fluids is excellent. It is a pure chemical substance, D (-) Threo-1-p-nitrophenyl-2-dichloroacetamido- 1,3-propanediol, and has the following chemical structure.



This antibiotic exhibits a broad spectrum of activity. It is not only extremely active against Gram-negative microorganisms, but also against certain Gram-positive microorganisms. Many of the viruses are susceptible to chloromycetin, but it does not appear to be effective in infections where the virus is very small[4].

The following organisms are killed or inhibited by concentrations easily obtainable in blood and urine following recommended peroral dosage: *Bacillus mycoides, Borrelia recurrentis, Brucella abortus, Brucella suis, Brucella melitensis, Salmonella schottmülleri, Escherichia coli, Klebsiella pneumoniae, Pasteurella tularensis, Proteus vulgaris, Aerobacter aerogenes, Pseudomonas aeruginosa, Shigella paradysenteria, Staphylococcus pyogenes* var. *aureus* and *Streptococcus pyogenes*[5]. Chloromycetin is seven to 36 times as active as penicillin and two to 16 times as active as streptomycin against the Gram-negative species tested[6].

Assays in experimental animals show that this antibiotic is rapidly and almost completely absorbed from the gastrointestinal tract. Blood serum concentrations of the active form of the drug reach a peak within two hours after a single oral dose. Smaller amounts are present at eight hours, and at the end of 24 hours it cannot be detected in the blood. Maximum serum concentrations obtained tend to be proportional to the dose administered[7].

Chloromycetin is excreted largely in the urine. Appreciable amounts are found within one-half hour after a single oral dose, and maximal urine concentrations are reached at two to eight hours in dogs. The major portion of the drug is excreted as an inactive conjugate with glucuronic acid[8].

Indications in Veterinary Medicine

The clinical use of chloromycetin has given very promising results. It has proved highly effective against a number of bacteria, rickettsiae, and virus infections, including pulmonary infections (it is indicated in pneumonia of various types whether of bacterial or viral origin), bacterial infections associated with canine distemper, bacterial cystitis and nephritis, infectious panleukopenia, enteritis (particularly coliform), acute bacterial infections, metritis, and tonsillitis.

Virus infection experiments indicate some degree of activity against psittacosis,[9] pneumoencephalitis (Newcastle disease),[9] and lymphogranuloma venereum[10].

Chloromycetin is found in the bile of dogs but in concentrations lower than those in the blood[10]. Cerebrospinal fluid levels are lower and are attained more slowly, reaching 2.5 micrograms per cc. after a single dose of 75 mg. per kg. of body weight[7].

The following data have been taken from our experiences with the drug and should give those who are unfamiliar with it some insight

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as to what can be expected on clinical application.

Pulmonary Infections

The successful use of chloromycetin in pneumonia indicates that it has a rapid and effective action. It is recommended that treatment be continued from one to three days afer a normal temperature is reached to prevent relapse. (See table 1.)

Bacterial Infections Associated with Canine Distemper

Although no controlled veterinary studies using chloromycetin have been published to date, members of the veterinary profession have reported remarkable recoveries from the secondary invaders that nearly always accompany canine distemper[13]. (See table 2.)

Hsiung, *et al.*,[14] observed that *Micrococcus pyogenes* var. *albus* and species of streptococci were the most common organisms found in serous and mucopurulent ocular discharge in dogs. These microorganisms are very susceptible to this agent[6].

Williams and Dart[15] found detectable quantities in the cerebrospinal fluid approximately three hours after oral administration of the drug, the concentration being less than one-half that in blood serum obtained at the same time.

Bacterial Cystitis and Nephritis

Urinary tract infections, which rank second only to upper respiratory infections in occurrence,[16] are usually caused by Gram-negative organisms (*E. coli, A. aerogenes,* and *Pro. vulgaris*) or Gram-positive organisms (streptococci and staphylococci)[17,18]. *Corynebacterium renalis* has also been isolated from the urine.

Chloromycetin is effective in urinary infections due to susceptible organisms and in the case of mixed infections, there is no objection to concurrent administration of other antibiotics[4]. In some cases, it may react unfavorably when used with penicillin. This antagonism did not occur if penicillin was given first[19]. It is rated as the most efficient antibiotic in handling genitourinary infections in dogs, with the added advantage that it rarely produces nausea[20].

Herrold and Boand[21] found that of all the Gram-negative bacilli commonly encountered in the urinary tract by *in vitro* tests, chloromycetin was measurably more bacteriostatic and bacteriocidal than aureomycin.

This member of the antibiotic family is of value in urinary infections because it is stable in solutions over a pH range of 2 to 9 for more than 24 hours,[22] because it is non-toxic, because it rapidly appears in the urine and can be maintained there in high concentration following moderate dosage, and because its excretion is continuous[23]. The maximum concentration is found at two to eight hours depending upon the mode of administration. The oral administration to dogs provided measurable levels in the urine for 24 hours although it is recommended that it be given at eight-hour intervals. These data have been confirmed by Garvey, *et al.*[24].

Chittenden[25] found chloromycetin to be 25 times as effective against *E. coli* as penicillin, and five times as effective as streptomycin. Against *Kleb. pneumoniae,* it is seven times as effective as penicillin and 2.2 times as effective as streptomycin. It is 16 times as effective against *Pro. vulgaris* as streptomycin.

Comparison of the susceptibility of organisms to chloromycetin with the response of the individual species of bacteria to therapy demonstrated close correlation between the *in vivo* and *in vitro* activity of the antibiotic. The colon-aerogenes group of organisms was the most susceptible[24].

TABLE 1. The Use of Chloromycetin in Dogs and Cats having Clinical Pneumonia

Animal		Age (yr.)	Wt. kg.	Chloromycetin Amount Administered mg./kg.	mg./dose	Times per day	Remarks
1	Cat	6	4.8	104	250	2	Recovered in 3 da.
2	Dog	¼	2.7	280	250	3	" " 4 "
3	Dog	3½	30.0	100	1000	3	Died after 3 da.
4	Cat	9	3.6	203	250	3	No change after 5 da.
5	Dog	4/12	2.7	280	250	3	Recovered in 3 da.
6	Dog	4	25.0	90	750	3	" " 5 "
7	Cat	7/12	1.6	55	50	2	" " 3 "
8	Dog	1	6.0	125	250	3	" " 5 "
9	Cat	8	3.6	139	250	2	" " 5 "
10	Dog	3/12	2.7	280	250	3	" " 4 "

Massive doses of the drug were administered, however, no vomiting nor other untoward effects were noted.

As stated by Chittenden, *et al.*,[35] "It is too much to believe that any chemical or antibiotic can permanently control a urinary infection in the presence of obstructive lesions, urinary calculi, carcinoma or anomalies."

Dog 23 had a chronic nephritis and bacterial cystitis (*Pro. vulgaris*). Symptoms disappeared after seven days of treatment. The causative microorganism reappeared in the urine a week later. Streptomycin, terramycin, and aureomycin were all tried without beneficial results. Chloromycetin was used again. This time 500 mg. were administered intravenously twice daily and 2,000 mg. were given orally three times a day. The urine became negative after five days and has remained negative.

According to data in table 3, chloromycetin is effective against *Pro. vulgaris, A. aerogenes, E. coli,* Streptococcus, and Staphylococcus, and in some cases of *C. renalis* infection.

TABLE 2. The Use of Chloromycetin Against the Secondary Invaders of Distemper

Animal	Age	Wt. kg.	Chloromycetin Amount Administered mg./kg.	mg./dose	Times per day	Remarks
1	4 mo.	3.0	183	250	3	Recovered in 5 da.
2	4 yr.	20.0	150	1000	3	Destroyed after 6 da.
3	5 mo.*	8.2	186	500	3	" " 3 "
4	11 wk.*	13.6	73.5	500	2	Died after 8 da.
5	3 mo.*	5.0	75.0	250 (I)† 125 (M)††	3	Destroyed after 4 da.
6	8 wk.	4.5	111	125	4	Recovered in 4 da.
7	8 wk.	4.5	111	125	4	" " 4 "
8	8 wk.	4.0	125	125	4	" " 4 "
9	8 wk.	4.5	111	125	4	" " 4 "
10	8 wk.	4.0	125	125	4	Died after 4 da.
11	8 wk.	3.7	135	125	4	Recovered in 4 da.
12	4 mo.	3.0	250	250	3	" " 3 "
13	2 yr.	31.8	94	1000	3	Died after 7 da.
14	3 yr.	14.5	103.4	500	3	No change after 3 da.
15	2½ yr.	28.1	106.4	1000	3	Died after 4 da.
16	1 yr.	10.0	225	750	3	Recovered in 4 da.
17	2 yr.	14.7	102	500	3	" " 6 "
18	1 yr.	15.9	94	500	3	" " 7 "
19	1 yr.	13.6	110	500	3	" " 4 "
20	2 yr.	12.2	246	1000	3	No change after 5 da.
21	8 mo.	6.0	166	250	4	Recovered in 5 da.
22	3 mo.	4.5	166	250	3	" " 5 "
23	1 yr.	10.0	150	500	3	Recovered in 5 da.
24	6 mo.	6.0	125	250	3	" " 6 "
25	5½ mo.	9.0	164	500	3	" " 8 " Relapsed—Complete recovery after another 7 da.
26	7 mo.	8.6	174	500	3	Recovered in 5 da.
27	8 mo.	9.5	236	750	3	" " 4 "
28	7 wk.	2.0	150	100	3	" " 4 "
29	8 wk.	7.6	196	500	3	" " 5 "
30	3 mo.*	4.7	79.8	125	3	Destroyed after 2 da.
31	mo.	5.0	75.0	250 (I)† 125(M)††	3	" " 3 "
32	6 mo.	6.3	119	250	3	Recovered in 4 da.
33	3½ mo.*	4.2	89	250(I)† 125(M)††	3	Destroyed after 4 da.
34	8 mo.	15.0	50	250	3	Recovered in 4 da.
35	8 wk.*	3.6	73	250 (I)† 125(M)††	3	Died after 4 da.
36	2 yr.	20.4	104	250 (I)† 500 (M)††	3	Recovered in 7 da.
37	9 mo.	18.2	123	750	3	" " 4 "
38	7 mo.	9.0	164	500	3	" " 3 "
39	1 yr.	25.0	120	1000	3	Recovered in 5 da. after failure with aureomycin
40	18 mo.*	22.5	100	750	3	Died on 6th da.

*Showing nervous manifestations
†Initial dosage
††Maintenance dosage

Infectious Feline Panleukopenia

Streptomycin,[39] aureomycin,[37] and sulfonamides have been used on infectious feline panleukopenia. This paper gives the results following the use of chloromycetin. (See table 4.) According to these data, this antibiotic was 91.6% effective on cats affected with this infectious disease. White blood cell counts, ranging from 300 to 1,300 per cmm. of blood, were recorded among those treated.

Miscellaneous

Chloromycetin is effective in several disease entities besides those that have been mentioned in tables 1, 2, 3, and 4. These include acute mixed bacterial infections, septicemia, metritis, and enteritis. (See table 5.) Konde[28] reported that given orally at the rate of 25 mg. per lb. of body weight once the first day of treatment and 12.5 mg. per lb. of body weight twice daily for a total of seven days, if necessary, it proved to be efficient in the treatment of Gram-negative enteric infections that are resistant to sulfonamide therapy. The Salmonella group of bacilli causing enteric infections has been found to be extremely sensitive[29].

Definite value of this therapeutic agent has been demonstrated in the treatment of surgical infections[30]. At least 20 genera of bacteria, including one to 37 tested strains and species in each genus, have been found to be susceptible in clinically attainable concentrations ranging from 0.2 to 10 micrograms per cc.[5,6].

According to Gruhzit, *et al.*,[25] two dogs receiving 300 mg./kg. daily as a single dose for four days showed anorexia, loss of weight, and occasional vomiting. Dog 9 (table 5) failed to exhibit any of these untoward reactions.

TABLE 3. The Use of Chloromycetin in Bacterial Cystitis and Nephritis in Dogs

Animal	Age (yr.)	Causative Organism	Wt. (kg.)	Chloromycetin Amount mg./kg.	Chloromycetin Administered mg./dose	Times per day	Remarks
1	1½	*Pro. vulgaris*	29.5	68	500*	4	Recovered in 2 da.
2	3	*C. renalis*	22.5	(44.4	500	2	No change in 4 "
				(100	750	3	Recovered in 5 "
3	2½	Streptococcus	29.5	101	1000	3	" " 4 "
4	6½	*E. coli*	47.7	105	1250	4	" " 6 "
5	1	Staphylococcus	11.0	181.8	500	4	No change in 3 "
6	1½	*Pro. vulgaris*	29.5	50.8	500*	3	Recovered in 3 "
7	4	Streptococcus	29.5	101.7	1000	3	No change in 4 "
					500**	5	
8	8	*A. aerogenes*	12.7	244	750	4	Recovered in 5 "
9	4	*Pro. vulgaris*	32.0	93.7	1000	3	" " 10 "
10	8	*E. coli*	16.0	93.7	500	3	" " 4 "
11	3	*A. aerogenes*	22.5	100	750	3	" " 5 "
							Relapsed—Complete recovery in another 7 da.
12	6	*A. aerogenes*	12.0	250	750	4	Recovered in 5 da.
13	4	*E. coli*	23.0	98	750	3	" " 5 "
14	3	*Pro. vulgaris*	32.7	107	500*	1	" " 4 "
					1000	3	
15	1-1/3	*E. coli*	25.0	100	1000***		
					750	2	" " 3 "
16	11	*A. aerogenes*	35.0	150	1750	3	" " 4 "
17	5	(*Pro. vulgaris* (Streptococcus)	20.0	112.5	750	3	" " 6 "
18	1½	*Pro. vulgaris*	28.0	107	1000	3	Recovered in 5 da.
19	1½	(Hemolytic (Staphylococcus (*Pro. vulgaris*	22.5	100	750	3	" " 5 "
20	12	*A. aerogenes*	13.0	115	500	3	" " 5 "
21	4	*E. coli*	25.0	60	500	3	" " 4 "
22	12	Streptococcus	16.0	94	500	3	" " 5 "
23	3	*Pro. vulgaris*	25.4	177	1500	3	Symptoms disappeared in 7 da.
24	4	*Pro. vulgaris*	30.9	145	1500	3	Recovered in 10 da.
25	2	*Pro. vulgaris*	22.7	99	750	3	" " 7 "
26	½	*Pro. vulgaris*	3.0	100	100	3	" " 2 " after failure with penicillin
27	2	*A. aerogenes*	14.7	102	500	3	Recovered in 4 da.

*Intravenous administration
**Intravenous administration, initial dose
***Initial dose

Toxicity

Toxic reactions occurring in the course of therapy with this antibiotic are rare[21]. Clinical studies indicate that it produced no untoward effect on the liver; the hepatic tissue remaining normal during its administration. However, findings suggest that aureomycin may induce a reversible fatty metamorphosis of the liver[22].

Chloromycetin has been administered intravenously to dogs as an 8% solution in 75% propylene glycol, injected at the rate of approximately 3.5 ml. per minute. The doses employed were 50 and 100 mg. per kg. No symptoms were noted other than a transient rise in body temperature (0.5 to 1.1 F.) within an hour after injection and a return to normal in a few hours[6]. Intramuscular injections are not recommended. Although there is no commercial preparation for parenteral use available, the announcement of such an agent is imminent.

In recommended dosages, no dogs receiving parenteral or oral doses showed significant changes in total white cell or differential counts, blood non-protein nitrogen, nor blood sugar[6].

Summary

Clinical use of chloromycetin as a therapeutic agent against several bacterial infections encountered in veterinary medicine is reported.

Indications and observations following its use are discussed. Chloromycetin, as found in this study, was 80% effective in 10 dogs and cats having clinical pneumonia, 78.7% effective in 33 dogs against the secondary invaders of canine distemper (seven dogs showing nervous manifestations were not changed by the drug), 92.6% effective in 27 dogs with bacterial cystitis or nephritis, and 91.6% effective in 36 cats with infectious feline panleukopenia (with white blood cell counts ranging from 100

TABLE 4. The Use of Chloromycetin in Infectious Feline Panleukopenia (Infectious Feline Enteritis)

Animal	Age (mo.)	Wt. kg.	WBC Count	Chloromycetin Amount Administered mg./kg.	mg./dose	Times per day	Remarks
1	7	1.6	1250	312	250	2	Recovered in 4 da.
2	6	2.3	600	109	250	1	Died in 2 da.
3	12	2.2		113.6	250	1	Recovered in 3 da.
4	12	2.7	450	92	250	1	" " 3 "
5	7	1.8		139	250	1	" " 4 "
6	12	3.0		83	250	1	" " 3 "
7	12	3.0	500	166	250	2	" " 4 "
8	4	1.8	450	55	50	2	" " 4 "
9	5	1.8	100	55	50	2	Died after 1 da.
10	5	1.8		55	50	2	Recovered in 3 da.
11	8	1.6	1300	62.5	50	2	" " 4 "
12	3	1.0	300	100	50	2	Died after 1 da..
13	11	4.5	300	22	50	2	Recovered in 3 da. after failure with streptomycin
14	12	4.3		23	50	2	Recovered in 4 da.
15	6	2.2	950	45	50	2	" " 3 "
16	3	1.8	500	55	50	2	" " 3 "
17	6	2.2	550	45	50	2	" " 3 "
18	6	2.0		50	50	2	" " 3 "
19	3	1.4		55	50	2	" " 3 "
20	8	2.7	1300	37	50	2	" " 2 "
21	3	1.4	600	70	50	2	" " 2 "
22	4	1.6	950	60	50	2	" " 3 "
23	3	1.4	1200	70	50	2	" " 3 "
24	4	1.5	1300	66	50	2	" " 2 "
25	5	1.5	350	66	50	2	" " 4 "
26	7	1.8		55	50	2	" " 3 "
27	9	2.4	500	41	50	2	" " 2 "
28	7	2.2		45	50	2	" " 3 "
29	8	2.6	600	38	50	2	" " 3 "
30	6	1.5	300	66	50	2	" " 4 "
31	6	1.6		60	50	2	" " 3 "
32	5	1.4	1000	70	50	2	" " 2 "
33	7	1.7	600	59	50	2	" " 3 "
34	6	1.7		82	50	3	" " 3 "
35	6	1.6		55	50	2	" " 2 "
36	5	1.3		115	50	3	" " 4 "

to 1,300 per cmm. of blood), as well as in such disease entities as acute infections, septicemias, metritis and non-specific enteritis.

Chloromycetin has the advantage that it may be administered orally and is singularly devoid of gastrointestinal, neurotoxic, cutaneous or allergic reactions.

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(*Continued on page* 493)

TABLE 5. The Use of Chloromycetin in Miscellaneous Disease Entities

Animal	Age (yr.)	Diagnosis	Wt. kg.	Chloromycetin Amount Administered mg./kg.	mg./dose	Times per day	Remarks
1	7	Acute infection	15.0	100	500	3	Recovered in 7 da.
2	1/12	Dermatitis, pustular	9.0	55.5	250	2	No change in 7 da.
3	8/12	Tonsillitis	19.0	79	750	2	No change in 4 da.
4	11	Prostatitis	12.7	78.7	500	2	No change in 13 da.
5	9/12	Chronic bronchitis	9.0	83	250	3	Improved in 7 da.
6	4	Strep. septicemia	24.1	62	500	3	Recovered in 2 da. after failure with penicillin, streptomycin and neomycin
7	3	(Metritis (hemolytic (streptococcus	18.0	83	500	3	Recovered in 4 da.
8	7/12	Tonsillitis	24.7	60	750	2	No change in 4 da.
9	3	Acute infection	33.0	300	1000	3	Recovered in 5 da.
10	8/12	Enteritis, non-specific	19.0	118	750	3	Recovered in 5 da. after failure with streptomycin and neomycin

Polymyxin. A Study Of Its Application In Equine Practice*

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POLYMYXIN,[1] an antibiotic agent derived from *Bacillus polymyxa*,[2] was shown to have a high degree of activity against Gram-negative organisms[3]. The activity of this antibiotic against Gram-negative organisms suggested possibilities of its use in control of infections occurring in horses. *Shigella equuli* is frequently the cause of septicemic infection and pyoarthritis of young foals. In older horses, this bacterium sometimes invades verminous aneurysms of the anterior mesenteric artery, resulting in fatal septicemic infection[4]. Outbreaks of diarrhea in young foals with fatal termination from *Escherichia coli* septicemia are not uncommon. *Pseudomonas aeruginosa, Aerobacter aerogenes,* and *Escherichia coli* infections of the genital tract of mares are often observed. Abortion due to *Ps. aeruginosa* has been recorded[5].

Material and Methods

A single lot of polymyxin E (Pitman-Moore Company) was used throughout this study. *In vitro* inhibition determinations were made by the broth dilution method using Difco brain-heart infusion broth as the medium. The polymyxin standard was prepared by dissolving the dry antibiotic substance in glycine-HCl buffer, pH 2, to give 1,000 micrograms per cc. Twofold serial dilutions of the polymyxin standard were made in 0.5 cc. quantity in the brain-heart infusion broth, after which 0.5 cc. of a 1:100 dilution in broth of a 24-hour broth culture of the organism to be tested was added to each tube. The results were read after 24 hours' incubation at 37 C.

The procedure used for serum level assay was the same as that reported by Stansly,[6] with the following modifications. After finding that whole horse blood could not be used satisfactorily, an acid serum mixture, consisting of equal parts of serum and 0.05 N HCl, was employed for the blood level assay. One-half inch filter discs were used instead of the ¼ in. size. Blood samples were obtained from the jugular vein, allowed to clot in a water bath at 37 C., and centrifuged. The serum was removed, mixed with equal parts of 0.05 N HCl, and kept frozen at —18 C. until the assays were made. All assays were controlled by serum obtained prior to administration of the polymyxin.

The horses used for the blood level studies were apparently normal weanlings. During the dosage trials they were quartered in box stalls with free access to hay and water. Grain was fed on regular schedule twice daily. The polymyxin was dissolved in distilled water and injected intramuscularly in the triceps, pectoral, and neck muscles. The entire dose was injected at one site.

Results

The results of testing for *in vitro* inhibition of various microorganisms are summarized in table 1. The Gram-negative microorganisms were uniformly susceptible to the action of polymyxin, whereas the Gram-positive cultures were quite resistant. Twelve of the 16 cultures of *Ps. aeruginosa* were inhibited by less than 1 microgram of polymyxin per cc. of medium. Less than 1 microgram per cc. inhibited five of six cultures of *Sh. equuli*. The concentrations of polymyxin required for inhibition of the streptococci cultures was quite variable. One culture each was inhibited by 1.56 and 3.12

TABLE 1. *In vitro* **Inhibition of Bacterial Cultures from Equine Infections by Polymyxin**

Organism	Number of Cultures	Concentration Required for Inhibition*
Pseudomonas aeruginosa	16	0.01-3.12
Shigella equuli	6	0.01-6.25
Streptococci	14	1.56-50
Escherichia coli	2	0.04-0.19
Staphylococcus aureus	1	> 100
Corynebacterium equi	1	> 25

*Micrograms of polymyxin per cc. of medium required for complete inhibition of growth using a 24 hr. incubation period.

*The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the director.

micrograms per cc., respectively. For the remaining cultures of streptococci, 12.5 to 50 micrograms per cc. of medium were required for inhibition of growth. A single culture each of *Staphylococcus aureus* and *Corynebacterium equi* were quite resistant.

The serum level response was determined on three animals following a single intramuscular injection of polymyxin. A dose of 1 microgram per lb. resulted in serum levels of 1.6, 2.3, 1, and 1 micrograms of polymyxin per cc. of serum for respective periods of 1, 4, 8, and 12 hours following injection. For the same bleeding periods, a dose of 2 mg. per lb. of body weight resulted in respective serum levels of 2, 1.25, 1, and 1 micrograms per cc. of serum, and a dose of 4 mg. per lb. produced serum levels of 5, 3, 2.2, and 2 mg. per cc.

TABLE 2. Serum Levels of Polymyxin Resulting from Intramuscular Injection at 12-Hour Intervals

Weight in lb.	Dose, mg. per lb.	Serum levels of polymyxin at specified hours following injection*									
		0	1	12	1	12	1	12	24	36	48
355	2	0	3.0	1.5	6.0	1.0	2.2	1.0	>1.0	0.0	0.0
520	2	0	7.0	1.0	6.0	0.6	7.4	1.0	>1.0	>1.0	0.0
500	1	0	3.0	1.0	2.0	1.0	4.0	1.0	>1.0	0.0	0.0
Dosage interval		+		+		+					

*Micrograms of polymyxin per cc. of serum.

The serum level responses obtained from consecutive administrations of polymyxin at 12-hour intervals are summarized in table 2. Serum samples were obtained at one and 12 hours after each injection and at 24, 36, and 48 hours following the last dose. Doses of 1 and 2 mg. per lb. of body weight maintained measurable serum levels throughout the dosage interval of 12 hours and also for 24 hours following the third dose. The rise and fall of the serum concentration was not consistent following repeated doses of the same size.

Discussion

The cultures employed for the *in vitro* sensitivity tests were isolated from infections occurring in horses. All cultures of *Sh. equuli* were isolated from foals dying of septicemic infection. The *E. coli* and *S. aureus* cultures were obtained from aborted fetuses. The streptococci cultures (Lancefield Group C, Ogura type A) were isolated from aborted fetuses, infected foals, and infected genital tracts of mares. All cultures of *Ps. aeruginosa* were obtained from infected genital tracts of mares. While the Gram-positive cultures required relatively large quantities of polymyxin for *in vitro* inhibition, the susceptibility of *E. coli, Sh. equuli,* and *Ps. aeruginosa* was of such order to indicate that infections caused by these microorganisms may yield to treatment with polymyxin. The susceptibility range of most cultures was within the limits of blood levels obtained with 1 and 2 mg. of polymyxin per lb. of body weight.

Although *in vitro* sensitivity of Gram-negative organisms and the serum level response following intramuscular administration were of an order indicating satisfactory therapeutic applications, the irritant property of the antibiotic for horse tissues may preclude its practical usage. A severe inflammatory reaction occurred at all injection sites. Swelling and soreness of the muscular tissue was first observed eight to 12 hours after injection and the degree of the inflammatory reaction progressed for 24 to 36 hours, accompanied by extensive subcutaneous edema, soreness, stiffness, inactivity and inappetence. The appetite was regained in 24 to 36 hours, but the swelling, soreness, and lameness persisted for three to five days. Reaction areas 2 to 3 in. deep and 8 in. in diameter were observed on the lateral surface of the neck. Examination of the urine at 48 to 72 hours after administration of the polymyxin revealed no evidence of albuminuria. Since streptomycin[7] and aureomycin[8] are quite efficient in controlling *Sh. equuli* and *E. coli* infections and lack the irritant effects of polymyxin, it appears that they will serve more satisfactorily for controlling infections of the newborn foal. The stability of polymyxin and its activity against *Ps. aeruginosa* and *E. coli* indicate that it may be useful in local treatment of genital tract infections caused by these two microorganisms in mares. Limited preliminary trials with polymyxin in *Ps. aeruginosa* infections of the uterus of mares suggest that it may be a useful therapeutic agent for this condition.

Summary

Studies on *in vitro* sensitivity to polymyxin of microorganisms from equine infections and results of blood level studies have been pre-

sented. Possible applications of polymyxin in equine practice are limited due to irritation at injection sites. It may be useful for local treatment.

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The Clinical Use of Chloromycetin in Dogs and Cats

(*Continued from page* 490)

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Listeriosis of Cattle

(*Continued from page* 484)

weeks to three months. The exact mechanism involved has not as yet been determined but reference is made to the possibility of the presence of an inhibitory factor in the bovine brain.

This case should serve to alert southern veterinarians to the presence of this disease in that area.

Summary

Report of the first proved case of listeriosis in cattle from south Georgia is given. A brief review of the literature is included as well as the postmortem and laboratory findings in the case.

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Erratum

On page 462 of the November 1951 issue of VETERINARY MEDICINE appears a footnote reference to article entitled Estradiol Cyclopentylate (E.C.P.) in Anestrus Mares. This states in error that gonadogen is produced by the Cutter Laboratories, Berkeley, Calif. The product referred to (gonadogen®) is a trademark product of The Upjohn Company, Kalamazoo, Mich.

The Veterinarian And Food Sanitation

NEIL G. MacEACHERN,* Lt. Col., USAF (VC)

FOR the functioning of our modern global Air Force operations, food inspection has become a significant factor. More and more stress is being applied to the production of suitable rations both for dining hall and in-flight feeding. Recent scientific advancements in food research and development, involving nutrition, manufacturing processes and preservation of our subsistence supplies, require a force of inspectors well rounded in the knowledge of food technology, production, hygiene and sanitation.

The goal, of course, is to provide adequate meals to our aircrews and ground support personnel under all newly developing conditions and situations.

This is true not only in the Air Force but with our sister services of the Army and Navy as well. Whatever the mission of any of the services, the fact remains that man, in order to be effective, must be fed, and however diversified the nature of his duties, he cannot perform efficiently unless he has the necessary nourishment of palatable, wholesome food.

To emphasize the importance of food sanitation, it would be appropriate to refer to military histories of the world and relate the many instances where battle plans of great armies were altered, or battles won and lost, due to one of war's most violent enemies—food-borne diseases.

Unless some organization exercises constant vigilance in the preventive medical field to eliminate food-borne diseases, the following incidents could conceivably occur:

(A) A B-36 heavy Air Force bomber is on a top-secret strategical mission. The plane departs from one of our zone of interior Air Force bases whose function is to support the maintenance, supply, and administration of this particular mission. After six hours' flying time, in-flight lunch rations are consumed by the crew of 17. Within three hours, most of the crew are affected with violent gastro-intestinal pains, with nausea and severe diarrhea. The pilot and co-pilot are extremely ill and their senses are dulled. The mission must be aborted, emergency messages are sent out, and the plane with an almost non-functioning crew must land at the nearest base available—if they are able to find a base in time. The top-secret mission has failed. The results could be disastrous. An Air Force epidemiological team, consisting of a physician, veterinarian and sanitary engineer, after a thorough investigation come up with the answer: Staphylococcus food poisoning resulting from enterotoxins developed by contaminating organisms. A careless food handler in the in-flight kitchen back at the bomber's base innocently contaminated the meat content of the lunches by exposing it to an old infected cut on his finger tip.

(B) A fighter group is detailed an important support mission of a bomber escort nature involving tactical support of an operation. The Air Force supply and maintenance group supporting this fighter group is made up of key administrative and technically trained experts who have been given exhaustive orientation for this particular operation. Twenty-four hours before the take-off hour, several of these key airmen become violently ill with typical food poisoning symptoms. Of course the mission must be abandoned. Our ground offense is seriously hampered. Again the cause is laxity in food service sanitation. A coughing food handler has contaminated the greater portion of the noon-day meal, transmitting another food-borne disease to the airmen. These situations are very possible. They have happened and can happen again in all types of military aircraft and in Air Force dining halls.

What is the Air Force Medical Service doing to prevent disastrous occurrences of this nature? What organization has the responsibility of food service hygiene and sanitation?

Role of the Veterinarian

The Air Force Veterinary Service is made up of officers professionally qualified as graduate veterinarians and of enlisted airmen technicians, all trained in the food inspection fields. It has been well established that the modern veterinarian with his scientific background and his knowledge concerning disease potentials of food of animal origin, with little additional training, is a "natural" to perform the inspection of all foods of animal origin for the Department of Defense. Veterinary per-

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sonnel receive training in military and civilian schools on the technological details of the production intricacies of the meat, poultry, fish, and dairy industries. In many cases, station and depot commanders have relied heavily upon their veterinary officers in the ZI and overseas theaters to inspect foods of both animal and non-animal origin. The veterinary officer has acted as the inspection arm of the food procurement and supply services, protecting the financial interests of the government by insuring that foods of animal origin originated from approved sources of supply and met the applicable specification set forth in the purchase instrument. In other words, his responsibility was to see that subsistence originated from healthy, wholesome sources, was properly processed, transported, warehoused, stowed and handled, to the end that no avoidable deterioration or contamination occurred.

During World War II, the Army veterinarian, through his constant vigilance against food-borne diseases, had an important role in preventing a major outbreak from food-transmitted diseases among our armed forces.

Current policy planners of the Air Force Medical Service, being cognizant of the performance record of the Army Veterinary Corps, have delegated the responsibility of the inspection of all foods, animal and non-animal origin, to their newly organized Veterinary Service. In addition, the Air Force Veterinary Service is taking an active part in food research as it pertains to nutrition, in-flight feeding and equipment.

Base veterinarians are the work horses of the Air Force Medical Service food inspection programs. They function on the base surgeon's staff as technical experts in veterinary matters and maintain staff supervision over all base veterinary activities. They play a definite part on the base preventive medical team consisting of the physician, veterinarian, sanitary engineer, and other allied specialists.

Where the Army Veterinary Service food inspection program covered food from origin through all phases of handling and terminating at point of issue to the troops, the Air Force realized that a good percentage of the causes of food-borne diseases did not originate at food sources but was introduced in the food preparation phase of the dining hall operation by careless handling. To adequately cover the broad field of food inspection, the Air Force has extended its surveillance of food from the point of issue through the dining hall processing, practically into the mouths of the troops. This vigilance must cover the sanitation of all food handling facilities as well as the hygienic practice of food handling personnel.

Inspection Procedure

Before food reaches the dining halls, it has undergone a series of inspections based on rigid regulations enforced by the Air Force Veterinary Service, in conjunction with Army veterinary service and other recognized governmental inspection agencies, made up of the city, county, and state health inspection agencies; Public Health Service, Sea Food Inspection Agency, and Food and Drug Administration of the Federal Security Agency; Bureau of Animal Industry, and Production and Marketing Administration of the U. S. Department of Agriculture. Only the top quality of wholesome, nutritious food supplies is accepted. The Army Quartermaster Corps is responsible for procuring foods from appropriated funds for the Army, Navy, and Air Force. A joint inspection agreement has been developed between the Army and Air Force Veterinary Services in order to prevent duplication of effort. In the interest of economy, Air Force veterinary personnel make inspection at origin for the Army, Navy, and Air Force, when they are located closer to the point of inspection than are Army personnel, and *vice versa*. For preventing further duplication and in the interest of economy, additional facilities available in one department are utilized by the other services when applicable. Examples of these are the joint use of laboratories, training facilities, supply, publication of specifications, regulations, and training directives.

Sources of food supply to all Air Force bases must pass an initial veterinary sanitary inspection. Factors taken into consideration in approving these sources include the handling of federally approved products. Veterinary personnel supervise the processing of all foods of animal origin and place a VC stamp on inspected and passed items. Products must be packed in suitable packages or containers and transported in clean covered vehicles. Perishable items require refrigeration when transported over long distances.

On the arrival at an air base, all food must pass the central food inspection office where it is checked for approved sources, quantity and condition. If no original inspection has been conducted, the products are inspected for all terms of the contract, including type, class, and grade. If government-owned food products are shipped, inspectors check for quantity, soundness, and condition, and in some instances type, class and grade. To stress again

the broadness of the inspection field, veterinary personnel must be familiar with the processing or manufacturing of food ranging from potato chips to carcass beef, fruits and vegetables to dairy products. Items are again "VC stamped" upon acceptance and stored in either the dry or cold storage warehouses composing the commissary. Rejections for one base alone may amount to thousands of pounds monthly, saving the government considerable financial loss. Laboratory analysis is necessary in checking the food conformance to specifications.

The base sales officer is now accountable for the subsistence in storage. For proper storage and rotation of stocks to prevent deterioration, he relies on veterinary personnel supervision. Highly perishable food requires close scrutiny and must be used at the first signs of coming deterioration. Regulations require that subsistence over one month of age be carefully inspected for signs of deterioration and spoilage. Food supplies of dry and cold storage warehouses must be screened monthly. Deteriorated stores are surveyed with the Base Veterinarian's certificate of condemnation used as a supporting voucher.

Base sanitary regulations require that dining halls draw and transport their rations from the commissary in clean, covered trucks. Food issued to food service personnel must be checked again for soundness and condition. Sales store items also receive daily surveillance.

Non-appropriated Fund Activities

Subsistence procured by officers' clubs, civilian cafeterias, Air Force exchanges, etc., is usually purchased locally in smaller lots. This requires approving vendor sources otherwise too small to bid on government contracts. These establishments need much closer supervision as they usually act as distributors of federally approved and non-federally approved products.

Menu Planning

The base veterinarian represents the surgeon on the menu planning board, which insures that meals are wholesome, nutritious, and palatable. Menu plans are often changed to keep abreast of market availability, climatic conditions, acceptability to the troops, and correction of nutritional inadequacies.

Food Sanitation and Hygiene

All these exhausting inspection man-hours, supported at government expense, are lost if food service personnel responsible for dining hall management relax in their sanitary and hygienic practices, allow rations to become contaminated or deteriorated, and fail in their responsibility to provide attractive, wholesome, nutritious meals. To accomplish the medical supervision over this operation, the Veterinary Service is concerned only with the sanitary and hygienic aspects of food handling, not with the art of cooking and the business of dining hall management. For such problems as mechanical or engineering sanitary deficiencies of kitchen equipment, waste disposal, or rodent and insect control, the veterinary officer can rely on advice from his preventive medical associate, the consulting sanitary engineer. Veterinary and food service officers, understanding each others' functions, work together as a harmonious team with the ultimate result in mind—the health, morale and welfare of the troops they serve. The Air Force Medical Service has published regulations designed to cover all recognized and approved sanitary and hygienic practices concerning food and food handling. Strict compliance with the intent of these regulations is necessary to keep the incidence of food-borne diseases at an absolute minimum. Personnel in the field of food service should become familiar with every detail of these regulations and do their utmost to comply with their contents.

In-flight Feeding

Great emphasis is being placed on in-flight feeding. Advances in food research along nutrition, manufacturing, processing, and preparation lines are meeting advances in new aircraft design and performance. Methods for prepared in-flight meals and their utilization while in flight are rapidly progressing. Sanitary regulations are enforced to insure hygienic and sanitation handling practices, proper food ingredients that will inhibit bacterial growth, and sanitary design of in-flight feeding and preparation equipment. Feeding fighter pilots on high altitude missions, solids and liquids, is a sample of one of the problems. This type of food service requires efficient surveillance.

Civilian Eating and Drinking Establishments

Civilian restaurants, snack-bars and drinking establishments, visited by personnel, close to Air Force Bases, require continual surveillance. Working with the local health authorities, the Medical Service protects the health of their personnel by recommending corrective sanitary measures to establishment owners, and placing them "off limits" to military personnel if they become a health hazard.

Food Security

Some of the chemical, atomic, and other as yet little used types of warfare create many new problems involving food-borne diseases. An enemy attack might very well include sabotage of food supply by biological and other types of contamination so that food could be an important medium for transmission of diseases to military and civilian populations. Veterinary officers are being trained in research centers to become familiar with various problems in this type of warfare. These officers, when indoctrinated, will be utilized in the further orientation of other Air Force personnel and in the training of veterinary personnel in safeguarding food supplies against sabotage.

Added Responsibilities Overseas

The principles in conducting food inspection overseas are the same as in the zone of interior, but the nature of such inspections may differ in several respects. The greatest bulk of our food supplies are purchased in the United States. These supplies, when received overseas, have been subjected to rough handling and are comparatively old or nearing the limits of storage life. Prevention of deterioration and spoilage of subsistence is a prime objective. Inspection frequently must be conducted in surroundings and under conditions which are not conducive to good sanitary practices. In many instances, food supplies must be procured locally and this requires antemortem and postmortem inspections of livestock. Also, a thorough inspection of milk supplies at their sources is required. Government food inspection agencies that exist in the United States are, in some cases, nonexistent overseas. The entire work-load of local procurement inspection must be borne by the veterinary officer.

Responsibility

Those with considerable experience in the food field know that the inevitable food-borne disease outbreaks may occur at any base. Often one seems unconcerned with preventive medical practices until occurrences such as the two hypothetical missions cited. Then the roof caves in. Everyone is concerned through all echelons of command. Who has been negligent? Have the veterinary officer, sales officer and food service officer been applying strict disease preventive measures to protect the health of the troops? Someone is usually the "scapegoat" if carelessness can be proven.

The scientific medical team, consisting of the physician, veterinarian, and sanitary engineer, can usually uncover the cause of these outbreaks and recommend corrective measures. The food service officer has the responsibility of putting these recommendations into effect and seeing that they are enforced.

Veterinary personnel, as members of the Air Force Medical Service preventive medical team, are no doubt partly responsible for the Air Force's distinction of obtaining a low hospitalization and non-effective rate. They are constantly striving to eliminate diseases by stressing sanitary and hygienic food handling practices. Their broad concept of food technology and practices of food sanitation have enhanced the health and efficiency of Air Force personnel. They play a most important role in the success of our modern Air Force.

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Capt. Freeman N. Hall, KSC '42, Harrison, Ark., Commanding Officer of the 104th Veterinary Food Inspection Detachment, Sendai, Japan, since January 1950, has been reassigned to the 2nd Logistical Command, Korea. Filling the vacancy created by the captain's transfer will be Maj. Clinton L. Gould, WASH '37, Hydesville, Calif.

Since Captain Hall assumed command of the organization nearly 20 months ago, not one serious epidemic nor food poisoning case has occurred in the Sendai area involving Americans or Occupation personnel.

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Use of a saturated solution of sodium nitrate is preferred by some for examination of fecal specimens for parasitic ova.

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PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Blood in the excreta of cattle is now being more specifically diagnosed rather than simply designating the condition as hematuria, and enterorrhagia. The old specific etiology for the former was southern cattle fever and for the latter coccidiosis. Then Records and Vawter in Nevada established a specific diagnosis of "red water" disease and demonstrated its etiological agent as *Clostridium hemolyticum*. In the Middle West, bloody urine has been a diagnostic problem; the disease may appear suddenly in several members of a herd with fatal termination.

Now comes a report from the laboratories of Cornell University that Leptospira were found in the kidney tubules, and a serum test by the complement fixation method demonstated the specific amboceptors for leptospiral infection. Then Canadian and California researchers described a hemoglobinuria of cattle, presumably as a symptom of an enterotoxemia, from which the *Clostridium perfringens*, type A, was isolated, and in which there was a favorable response in giving a large measure of protection following the use of the *Clostridium perfringens*, type D, antitoxin; the agent effective in enterotoxemia of sheep. Headway is being made.

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A substitute drug for morphine sulfate is known as methadone. It is reported as being used by the armed services in Korea. It is the exact equivalent of morphine in relieving pain, and since it has addiction qualities, it comes under the provisions of the federal Harrison Anti-Narcotic Act. It was originally developed in Germany during World War II. It is made from nitriles—these are cheap, organic chemical compounds containing trivalent nitrogen.

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It is authoritatively reported that enzootic abortion in ewes as observed in southeast Scotland is caused by a virus of the psittacosis lymphogranuloma group. The fetal membranes are the only tissues susceptible to injury by the virus. Ewes that were inoculated with a small dose of the virus before pregnancy, and about two months later with a formalized vaccine, and bred a month later, had apparent protection.

It would seem advisable to this writer that until more is known about the apparent antagonistic action of chemotherapeutic agents, or possibly their synergistic properties, use of combinations of certain antibiotics, or even combinations of antibiotics and sulfonamides should be avoided. For example, penicillin is bacteriostatic against certain actively proliferating organisms. If the bacterial activity is reduced by the previous use of an antibiotic only moderately effective against an actively growing organism, then the subsequent therapeutic action of the penicillin would most likely be nullified. The synergistic action of bacitracin and streptomycin, active against nonproliferating organisms and penicillin in combination seems therapeutically sound. Also, in human medicine at least, dihydrostreptomycin combined with aureomycin, is reported as effective in alleviating the symptoms of brucellosis.

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The *American Journal of Public Health*, Part I, May 1951, page 573, has an excellent article entitled, Proposed Report on Educational Qualifications of Public Health Veterinarians. The proposed report was prepared by a subcommittee, consisting of veterinarians and public health persons (Dr. J. H. Steele, Chairman) for the Committee on Professional Education of the American Public Health Association. It is stated that the "proposed report" is an attempt at "periodic revision in order that it may be kept abreast of the best thought." It takes up such matters as General Scope of the Field; Future Outlook; Functions of Public Health Veterinarians; Educational Background of Veterinarians; Graduate Education, Training, and Experience and Personal Qualities. The article merits careful study by all those interested in veterinary public health activities.

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The Cuboni pregnancy test so highly accurate in mares after the appearance of estrogen in sufficient concentration in the urine after 120 days of pregnancy, is valueless as a pregnancy test in cattle. Estrogens appear in the urine of pregnant cows at such a late stage of pregnancy that diagnosis can be made easily by a physical examination.

EDITORIAL COMMENTS

Use of Milking Machines

Mastitis control in New York State designated an interesting and educational exhibit at the recent annual meeting of the Southern Veterinary Medical Association in Baltimore, Md. It graphically portrayed accomplishments toward mastitis control in dairy herds located within the state borders. Of interest for study, and provided visitors, was an abstract prepared by Dr. D. T. Baker entitled Milking Machines, which emphasized the importance of proper management of this apparatus in mastitis control as a herd problem, and from which the following excerpts are taken.

"Since the New York state mastitis program was established in 1946, much information has been collected regarding herd management and sanitation. In 1950, Dr. E. W. Tucker started analyzing these data. These studies definitely indicate the importance of good environment and sanitation in mastitis control. A list of herd management factors was made in order of their importance, and at the top of this list was the 'use of the milking machine'.

"In order to check mechanical condition and operation of milking machines, all field veterinarians on the New York state program carry a reliable vacuum gauge and consider it an important part of a survey to check the vacuum lines, starting near the pump and checking at several stall cocks throughout the line. By so doing, one may detect too high or low vacuum, partially or completely plugged stall cocks or lines, plugged or sticky regulators. Plugged lines and sticky regulators may cause too high or low vacuum and this will result in prolonged milking time which may lead to the development of mastitis.

"In addition to checking the line, it has been found beneficial to assemble the milking units and check the pulsators for mechanical wear and also rate of pulsation. The vacuum at the teat cups should also be checked. A marked decrease of vacuum from the line to the teat cup may be caused by plugged air hoses, leaky pulsators, cracked rubbers or air leaks around gaskets or stall cocks.

"The adjustment of milking machines to control amount or inches of vacuum and still have an even but not a harsh vacuum is more complicated than one realizes. Many of the low vacuum machines or those that are moderately high produce a harsh action at the teat cup if installed or operated improperly. This harsh action may cause several heifers or cows in a herd to object to the use of the machine. This was brought to our attention by Dr. S. D. Johnson, who has proved to many owners that some of these machines need an additional vacuum regulator or a larger one. Since this was pointed out by Doctor Johnson, other herds have been observed having a large number of mastitis flare-ups which may have been brought about by harsh machine vacuum. This may be a false assumption; but nevertheless after the installation of additional regulators or a larger regulator, the cows became more comfortable and milked out faster. Flare-ups have subsided. The pump that produces the vacuum should always be of adequate capacity. Then if the vacuum seems to be harsh, one or two additional regulators may be installed along the line to control this vacuum, and a good even vacuum will result. If one regulator is used it should be installed near the pump; but if two are used, one should be near the pump and one somewhere else along the line, usually on the opposite side of the barn from the pump.

"There are two very important reasons for the installation of a vacuum regulator near the pump rather than at the far end of the barn if only one regulator is to be used. This installation will (1) maintain a more uniform vacuum throughout the line and (2) avoid a build up of vacuum between a plug in the line and the pump.

"It has been observed frequently that pumps that produce too little vacuum, pumps that are too small for the operation or those that are in poor repair and incapable of producing enough vacuum to maintain proper functioning of the milker, often prolong the milking and may cause mastitis flare-ups. The vacuum should be constant whether it is ten or 15 inches.

"The necessity of improving hygiene in regard to milking machines is constantly being emphasized and many dairymen are recognizing the importance of keeping rubber inflations clean and free from blemishes. The use of two sets of inflations for each machine is advised. After the use of a set from seven to ten days, boiling in a lye solution is recommended. Once an owner gets in the habit of following this practice he likes it because the inflations last longer, milk more efficiently and remain clean.

"In addition to maintaining clean and properly adjusted milking machines, dairymen should follow those milking practices which

have been proved to facilitate rapid and complete milking.

"It is realized that the importance of the adjustment and use of the milking machine in regard to the control of mastitis may be proved to be over-emphasized by future research work. However, at the present time because of observations made and results obtained in the field, it is believed that by neglecting the milking machines, a very important factor in the control of mastitis would be missed."

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Antibiotics in Animal Nutrition

An antibiotic feed supplement is a feeding material incorporated in the mixed ration primarily for its antibiotic content. This designation officially recognizing and defining these supplements was announced following the October 1950 meeting of the American Feed Control Officials in Washington, D. C. (See *Veterinary Medicine*, 45:497 [Dec.], 1950.)

When offered for sale, antibiotic feed supplements must be labeled with the name and amount of the specific antibiotic. They must contain not less than 1 gm. of antibiotic per pound and be declared for nutritional use only. Furthermore, directions shall declare that no more than 50 gm. of the antibiotic shall be added per ton of mixed rations as consumed by animals. In the feed bag offered for sale, it is not necessary to declare exact amounts of supplement added nor the name of such product, but only that it has been added. The reason for this is that the amounts added cannot be detected nor identified after mixing.

During the past 18 months "antibiotics" has become a common word of feeders of swine and poultry. Widespread use followed closely releases of voluminous experimental data which indicated marked growth stimulation, yet the manner of action is uncertain. There is lack of evidence to date that antibiotics are effective nutritionally for increasing milk or egg production and no deficiencies result from their deletion from the ration.

There are many unanswered questions concerning use of these chemotherapeutic agents in nutrition and regarding what may be considered a therapeutic level. Finally, the sum total of our information, in brief, is that antibiotics are complex chemicals produced by some microorganisms which have the capacity to inhibit or destroy the growth of other microorganisms. A few of these agents have been observed to increase growth and feed efficiency when added to the rations of young, growing swine and some classes of poultry.

Dr. Forrest F. Tenney, Peterboro, N. H. (standing), newly elected president of the New England Veterinary Medical Association, addressing members attending the 17th annual convention held at Manchester, Vt., October 19-20, 1951. Dr. David A. Walker, Morrisville, Vt., (right) is the retiring official of this organization. Dr. N. W. Pieper, Middletown, Conn., was elected president-elect and Dr. C. L. Blakely, Boston, Mass., re-elected secretary-treasurer.

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Lapinized Rinderpest Vaccine

Reports on experimental and field trials in India indicate that the control of rinderpest in that country has become a practical possibility (Datta, S., *et al., Indian Vet. Jour.*, 28:1 [July], 1951).

Vaccination of 841 cattle, including cows in milk, 29 buffaloes, 108 goats, and 186 sheep, with lapinized vaccine was undertaken. In all of these subjects only mild thermal reactions were recorded, which did not interfere with milk yields or the general health of the animals. This is in contrast to vaccines previously employed that caused severe reactions. Challenge of immunity has to date (15 months post-vaccination) demonstrated serviceable protection.

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Dr. John R. Wells, president of the A.V.M.A., is authority for the statement that approximately 30% of veterinarians in the United States are not now members of the A.V.M.A. In his addresses before veterinary groups this fall, President Wells has urged all to assist in increasing membership in the national organization.

FAO/WHO Brucellosis Centers

A good example of successful international cooperation may be found in the FAO/WHO brucellosis centers. These were established in 1950 and early 1951, and are helping to coordinate the activities of WHO, FAO, and the Office International des Epizooties (OIE), in addition to furthering research on problems relative to brucellosis.

The centers now number 12 and are located in Argentina (Buenos Aires), Australia (Parkville, Victoria), Denmark (Copenhagen), England (Weybridge, Surrey), France (Montpellier, Hérault), Greece (Athens), Italy (Florence), Mexico (Mexico City), Turkey (Ankara), Union of South Africa (Onderstepoort), United States (Minneapolis, Minn.), and Yugoslavia (Rijeka). It is planned to established one additional center in Latin America, and two in the Far East.

Specific research projects, coordinated by WHO—with the collaboration of FAO and OIE—are under way at the various locations.

The brucellosis centers, and the national health administrations which they serve, are cooperating with WHO and FAO in such a way as to make their work an invaluable asset to the advancement of knowledge concerning brucellosis and its control.—*Chron. WHO.*

Southern Veterinary Medical Association

An excellent, well balanced program attracted wide interest and record attendance at the Southern Veterinary Medical Association's 34th annual convention, held at Baltimore, Md., October 22-24, 1951.

Officers selected to serve the group for the coming year are: president, F. M. Kearns, Louisville, Ky.; president-elect, John D. Gadd, Cockeysville, Md.; secretary, A. A. Husman, Raleigh, N. Car.; 1st vice-president, W. G. Brock, Dallas, Tex.; 2nd vice-president, Clyde W. Young, Mocksville, N. Car.; treasurer, M. R. Blackstock, Spartanburg, S. Car.; directors, Thomas J. Jones, Athens, Ga., and E. H. Durr, Jackson, Miss.

The annual meeting for 1952 will be held in Jackson, Miss.; dates to be announced.

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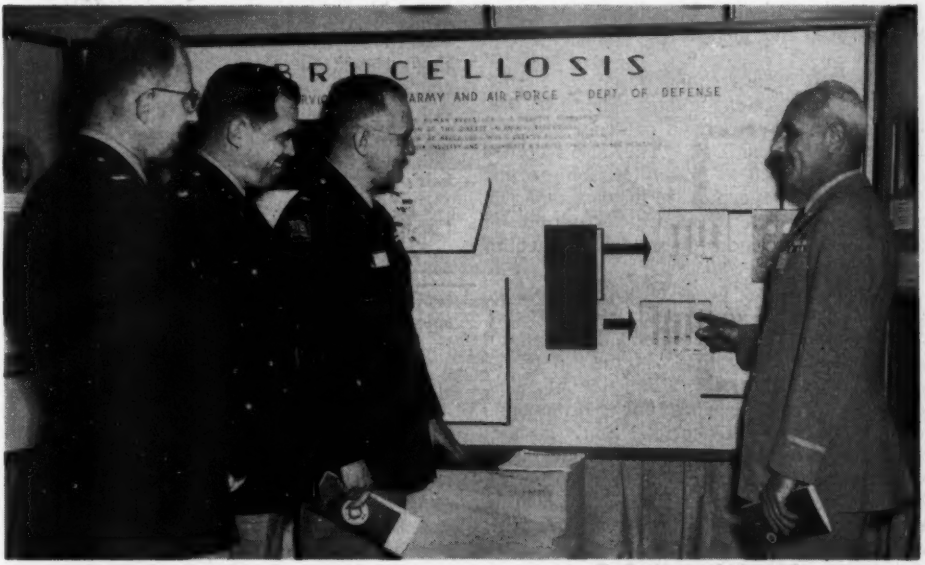
A new method of artificial insemination of poultry is the subject of an exhaustive report appearing in *The Onderstepoort Journal of Veterinary Research*, May 1951. The author of this treatise has described a technic by which ova of birds could be fertilized with semen discharged in the region of the ovary by intraperitoneal injection.



U. S. Army photograph

Brigadier General J. A. McCallam (right), chief of Veterinary Division, U. S. Army, discusses an exhibit with three veterinary officers; Col. C. W. Betzold and Major R. L. Jimison, both of the Chicago Quartermaster Depot, and Col. O. H. Dixon, chief veterinarian of the Fifth Army. The exhibit was one of the many at the 58th annual convention of the Association of Military Surgeons of the United States, held October 8-10, 1951, at the Palmer House, Chicago.

PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
Atlanta, Georgia

Cat Diseases Transmissible to Man

Drs. W. E. R. Greer and C. S. Keefer, report in the *New England Journal of Medicine* (April 12, 1951) on a disease entity resulting from cat scratches. This disease, according to the authors, is transmitted by scratches which result in a septicemia from which no etiological agent has been isolated. The term, cat scratch fever, was first used by Dr. Lee Foshay, of Cincinnati, to describe lymphadenitis of unknown etiology following such injuries. The ailment is suggestive of a mild form of tularemia. Although it is a systemic disease associated with malaise, fever and other general symptoms of an infection, the most noticeable effect is within the lymph nodes. Occasionally, exanthema occur resembling *erythema multiforme*. The case reported by Doctors Greer and Keefer is the first to have exhibited *erythema nodosum*. Although the infective agent has never been identified, something is present in the pus from buboes which produces a specific skin reaction after it has been made into a skin antigen. The disease is a self-limited one, and no specific therapy is indicated.

There has been a similar report in French literature in which the authors stated that they had studied ten cat-scratch cases but reported in detail on only one case. They also recorded a positive reaction to Foshay cat antigen and believed it to be specific. In the case reported, a six-year-old child developed a syndrome of fever, inguinal adenopathy and local folliculitis after contact with a cat.

There is not too much information on the dangers of disease transmission by house cats. Since the cat, as well as other animals, shares many diseases or parasites with man, it can be a reservoir host. The transmission of feline diseases to man depends on environmental factors and types of contact. Some diseases that have been reported to be transmissible are: tularemia, cat and rat bite fever, brucellosis, bovine tuberculosis, murine typhus, ringworm, creeping eruption, rabies, and many parasitic diseases. Diphtheria has long been suspected as being carried by the domestic cat. Investigations of this have not been conclusive. It is possible that cats may harbor spirochetes of leptospirosis, especially those cats which frequent slaughterhouses, fisheries and similar areas. There are other diseases found in this animal that also infect man, but no evidence has been found as to their transmission. An example is histoplasmosis. Some investigators have suspected that there is a relationship between feline virus pneumonia and primary atypical pneumonia in man.

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Miscellaneous Items of Interest

The last report of foot-and-mouth disease, rinderpest or contagious pleuropneumonia in Japan was in 1922. This speaks well for the veterinary service in that country.

The diagnostic services of the laboratory division of the Communicable Disease Center reports some interesting rarities in their Third Quarterly Report for Fiscal Year 1951. Included in these was a dog fecal specimen from Florida which contained Diphyllobothrium eggs, a human fecal sample from Massachusetts containing oocysts of Isospora and a liver cyst caused by Echinococcosis which was received from the Veterans Administration Hospital. An unusual specimen of mites was received from Tampa, Fla. This was *Pneumonyssus caninum*, (Chandler) which was found in the upper respiratory passages of a dog. This is the fourth such finding from that area. Of 455 sera for trichinosis examined, 7% were positive. Of 84 sera examined for echinococcosis, 7% were positive (two from Georgia, two from New York, one from North Carolina and one from Pennsylvania).

The incidence of trichinosis is not unexpected but the presence of echinococcosis infection in man is quite startling when we consider that only 600 cases have been reported in the United States in the past 50 years.

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Rabies

Dr. Frank M. Lee, Public Health Veterinarian for the South Carolina Board of Health, reports the results of Rabies Control Week, 1951. During this campaign, which was preceded by many weeks of planning, 53,310 dogs were vaccinated in 1,042 clinics. In addition, 43 cats were vaccinated. This program was carried out in the latter part of April, and subsequent reports indicate that by the end of May, 90,000 dogs had been vaccinated in the state.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

Infectious laryngotracheitis first became an economic problem for the poultry industry in 1925. It is still one of the important causes of losses in many areas, but is satisfactorily kept under control because vaccination of susceptible stock is continually practiced. Since the disease may be confused with some other respiratory infections, such as Newcastle disease, infectious bronchitis and fowl coryza, one should always keep it in mind whenever a respiratory disease affects a client's flocks. If the history shows that routine vaccination is not practiced, this fact should be passed along to the diagnostic laboratory when sick birds are forwarded, so that infectious laryngotracheitis will not be overlooked as a possibility by the diagnostician.

The disease is characterized by its sudden appearance in a flock; symptoms are difficult breathing, upward extension of the head, shaking of the head, and coughing. When a house is entered, characteristic rattling, whistling and gurgling sounds are heard. In acute cases, blood coughed from the trachea will be observed on the roosts, litter and walls. Autopsy will reveal a bloody caseous core in the trachea as the most common lesion. Diagnosis can only be confirmed by laboratory tests. Complete quarantine of affected houses and the maintenance of such quarantine may prevent the disease from spreading.

Vaccination of healthy flocks as a means of preventing the disease is recommended in areas where the disease is prevalent. If done promptly, vaccination may help to prevent spread on an infected premise where the initial outbreak is confined to one or two pens. For further information consult your text book on poultry diseases.

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According to Riedel and Ackert (*Poultry Sci.*, 30:497 [July], 1951) both quantity and sources of proteins may be factors in resistance of fowls to *Ascaridia galli*. Another factor in resistance of chickens to this nematode is age. This fact has been known but these authors present further evidence in the experiments reported by them. They found that as the ages of the infested chickens progressed, both the numbers and lengths of the worms were reduced.

Thermostabilization is a new term which may be used soon in the daily vocabulary of egg processors and others concerned with the handling of our nation's huge egg business. Goresline (*World's Poultry Sci. Jour.*, 7:101 [June-July], 1951) discusses the use of moderate, controlled heat applied to fresh eggs as a means of preserving them by several procedures now under investigation. Heat in some form is applied to the egg in a manner which will bring about a minimum physical change with no chemical change. One of the more recent methods being currently investigated by the USDA is treating the eggs in a heated oil bath, and immediately placing them in cold storage.

In one series of experiments, grade A eggs were treated for 16 minutes at temperatures ranging from 130 to 139 F. Eggs so treated were placed in cold storage with oiled eggs not heat-treated and with eggs not oiled nor heated. At the end of eight months, the percentage of grade A heated and oil-treated eggs remaining was 54.9%, as compared to 1.7% for the untreated and 42.2% for the oil-treated groups.

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In a study on egg breakage conducted by the New Jersey Agricultural Extension Service, it was found that poultrymen in that state lose $1,000,000. per year as a result of broken or cracked eggs. The following ten ways of preventing such losses have been suggested by Taylor of Rutgers University in *Poultry Tribune* for January 1951: (1) Provide 20 or more nests for each 100 layers. (2) Keep nests filled with clean bedding. (3) Keep at least 70 pullets for every 100 birds in the flock. (4) Avoid frightening birds on nests. (5) Use care in collecting eggs and in carrying them. (6) Collect eggs two or three times a day. (7) Avoid filling baskets too full. (8) Keep eggs level in basket. (9) Pack jumbo and extra large eggs separately. (10) Use only strong cases, fillers, and flats.

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Artificial lighting for turkey breeding hens should supplement sunlight to produce the equivalent of a 14-hour day to produce additional hatching eggs of good quality. Excessive lighting may produce more eggs but of poorer hatching quality. It takes twice the amount of light for turkeys as required for chickens.

CLINICAL REPORTS

Calfhood Diseases in India

ARLAN W. McCLURKIN, D.V.M.,
Madison, Wisconsin

For over three years, the disease in calves previously reported[1] has been under observation. Following studies on the effectiveness of penicillin in treating the disease, it was found that sulfamethazine was also effective in bringing about resolution if given orally at the rate of 3 gr. per lb. of body weight per day.

Observations and Isolation of Bacteria

The incidence of the infection remained high through the winter of 1949; after which newborn calves were penned in a different location from that used previously. Following this, no cases of the disease in question occurred until late in November 1950. By this time sufficient bacteriological culture media were accumulated to make a preliminary isolation of possible causative agents. All the bull calves which we did not wish to keep were put back into the old pen. Very shortly, the disease appeared in four of the first six calves placed in this pen. As all calves were cared for by the same man, the disease soon appeared in the previously uninfected pen.

The method of isolation of the possible causative agents consisted of enrichment of the fecal material, or intestinal contents, or spleen and lymph node tissue, in tetrathionate broth for 20 hours; then streaking on SS agar and making pour plates with bismuth sulfite agar*. Any colonies appearing on these two media were transferred to Russell double sugar agar and triple sugar iron agar for fermentation observations.

The observations from the use of the above mentioned media indicated that in the fecal samples of six calves, Proteus species was present, and in one case Proteus and Salmonella colonies were present. In another case, only Pseudomonas could be isolated from the fecal sample. In still another, colonies having the appearance of Salmonella were isolated from the spleen, intestinal lymph glands, and intestinal contents.

Colonies which appeared to be Salmonella were sent to a laboratory for identification and typing. The laboratory report confirmed our finding; the organisms were shown to be Salmonella with the antigenetic structure III,X:*r* monophasic.

From the above observation, it seems likely that several bacteria could be involved, but it is also probable that the isolated microorganism is the chief cause of the disease in all cases, though regularly only in the intestinal lymph glands.

Discussion

During the period of observation, it was noted that some calves would be showing symptoms as early as three days after birth, and that others which had been sold at birth and taken immediately from this farm, were afflicted within two or three days. The short incubation period led to the belief that some factor other than infection was involved.

The method of raising calves had been questioned for some time primarily because it is different from the method used in Kansas. In India, calves are separated from the cow immediately after birth, and fed from a bucket at the next regular calf feeding time. This is done because of the belief that any cow that becomes attached to her calf will "dry up" if the calf is taken away after a few days, or at best, lactation will be suppressed.

This, to be sure, would be an unfortunate circumstance in a large dairy. This belief is without foundation in the subject herd. In practice, with this method of feeding, calves are not fed until eight to ten hours after birth. Actually, it would be difficult to feed a newborn calf from a bucket much before this time.

Changes in the stomach lining of the calf a few hours after birth might prevent the calf from absorbing antibodies from the colostrum if not fed immediately after birth[2,3]. Thereafter the practice was changed to the extent that all calves were fed from their mother within the hour of birth and given a second feeding from their mother about four hours later; after which they were separated. This has not caused any cow to dry up nor to withhold milk.

Since the change in feeding practice, there have been no cases of the disease in question; either in the pen of bull calves kept for experimental observation or in the heifer calves that were kept purposefully in unsanitary conditions. At the time of writing, there have been about 30 calves born since the change of feeding practice. No special precautions have been

*Difco Products Co.

taken, and all of the bull calves have been placed within the old infected quarters. None has become ill.

Conclusions

In view of the temporary disappearance of the disease following a change of housing for the calves, it would appear that a bacterial agent is to be considered, but the sudden change in feeding practice would indicate that there is a definite relationship between prevention of the disease and the absorption of antibodies from the colostrum immediately after birth.

Acknowledgment

I am indebted to Dr. Philip R. Edwards of the Public Health Service Communicable Disease Center, Enteric Laboratories, Chamblee, Ga., for typing the cultures.

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An Observation on Aureomycin Therapy of Fowl Cholera in Pheasants

J. O. ALBERTS, V.M.D., Ph.D., and ROBERT GRAHAM,* D.V.M., B.S., Urbana, Illinois

The activity of aureomycin in experimental *Pasteurella multocida* infection of chickens was investigated by Little[1]. He observed that 40 mg. of aureomycin per kg. reduced losses about 80% when administered intramuscularly, beginning ½ hour after parenteral inoculation of the organism. Chicks that had access to mash containing 1 mg. aureomycin per gm. had 50% fewer losses than untreated controls. Prier[2] observed a reduction of 50 to 80% in losses of chicks treated parenterally at the time of or within one day after experimental inoculation of *P. multocida*. Only 15 to 30% fewer losses occurred among chicks that received 0.25 to 0.5 mg. aureomycin per gm. of mash.

During a sporadic outbreak of fowl cholera among approximately 7,000 seven-month-old, ring-necked pheasants, an opportunity was provided to observe the effect of aureomycin in reducing losses from this infection.

The birds were raised on a state game farm for breeding stock. At the beginning of the outbreak, the farm manager recognized the infection as one of possible bacterial origin. Sulfathiazole was added to the mash at a level of 0.5%, but losses continued to increase daily. Three visibly sick and two dead birds were brought to the Veterinary Pathology Laboratory, University of Illinois, for diagnosis. At autopsy, hemorrhages of the skeletal musculature and myocardium were seen. In addition, the liver appeared somewhat enlarged, congested, and studded with numerous, small, discrete areas of necrosis. A tentative diagnosis of fowl cholera was made and confirmed by bacteriological identification of *P. multocida* from heart and liver cultures.

Following the laboratory diagnosis of fowl cholera, the birds were given access to sulfaquinoxaline at a level of 0.03% in the mash. The sulfaquinoxaline mash mixture was not consumed by the birds in sufficient quantity to check losses. Inasmuch as the disease appeared during March, heavy rain storms and high winds that occurred at the time the sulfaquinoxaline-mash mixture was given cannot be disregarded as factors that helped reduce feed consumption. During the first 12 days of the outbreak, including the periods of sulfathiazole and sulfaquinoxaline therapy, approximately 3,500 pheasants died.

Aureomycin therapy was initiated in a group of 500 birds. These received crude aureomycin, a residue after primary extraction of the antibiotic, at a level of 4% in the mash for 19 days. The crude aureomycin residue contained 2.5% of the pure antibiotic. Thus the final concentration of aureomycin was 1 mg. per gm. of mash. During the 19-day period, 43 (8.6%) of the birds that had access to the aureomycin-mash mixture died, while 13 (5.2%) of 250 untreated control birds died.

At the time the crude aureomycin and mash mixture was given, 1,779 pheasants received orally a capsule containing 50 mg. of aureomycin hydrochloride. An additional 504 birds received 50 mg. of aureomycin-hydrochloride intramuscularly. During the 11 days following these individual treatments, 96 (5.4%) birds that had received 50 mg. of aureomycin hydrochloride orally died; 15 (2.9%) birds died in the group that received aureomycin hydrochloride intramuscularly; 12 (4.8%) of 248 untreated control birds died. On the 12th day after the first intramuscular injection of

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Acknowledgment is made to the Superintendent of the Illinois State Game Farms and Mr. R. J. Taft, for technical assistance. The aureomycin was provided by Lederle Laboratories, Pearl River, N. Y.

aureomycin hydrochloride, 439 pheasants received a second intramuscular injection of 50 mg. of the antibiotic. Eight (1.8%) of the treated birds died during the next 38 days, and 11 (4.9%) of 230 untreated control birds died.

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Hexylresorcinol (Caprokol Oil) in the Treatment of Uterine Infections in Cows

J. L. McAULIFF, D.V.M., W. V. PHILLIPS, D.V.M. and J. R. STEELE, D.V.M., Cortland, New York

Endometritis and cervicitis are conditions frequently found responsible for infertility in cows. The precise etiology of these conditions is not known to the authors; however, it is believed that in many cases it is due to the presence of microorganisms.

In our practice, chiefly with dairy cattle, frequent calls are received to examine and treat cows that have been bred repeatedly to known potent sires but have failed to conceive. Natural service is used on most of the animals; however, many are bred artificially. History varies somewhat in that some have had previous apparently normal pregnancies and parturition, while others have had abortions and in some instances temporary retention of placenta following parturition. In some of the latter patients, fetal membrances had been removed manually and intrauterine therapy given, such as antibacterial agents. One significant observation in these cases is that the cows have regular estrual periods. Physical examination usually reveals an enlarged uterus which, on palpation, is doughy and somewhat atonic. Vaginal examination by speculum usually reveals an enlarged congested cervix and not infrequently a cream-colored, fairly thick, mucopurulent discharge. Unfortunately careful bacteriological examination of the uterine secretions has not been made because of lack of adequate facilities. The fact that the cow does not conceive after repeated breeding is of great concern to the owner because of the economics involved. It is for this reason that the owner usually calls on the veterinarian for assistance. It is the practitioner's obligation to assist in every way and if possible treat the animal so that it will conceive at the earliest likely date.

A variety of agents have been and are used for the treatment of cases such as are here described. The Albrechtsen method,[1] consisting of uterine douches with iodine preparations, has been used; however, this treatment appears rather caustic and certainly causes great distress to the patient. Uneasiness and restlessness of the cow are evidence of discomfort following such therapy. Reduction of milk production for several days after treatment makes this an undesirable procedure in the opinion of many dairy cattle owners.

Sulfonamide-containing preparations and antibiotic therapy have been suggested and tried. Chambers[2] has reported on the use of penicillin in nonbreeding cows. In the writers' opinion this is a rather unstable agent and the therapeutic effect will soon be spent after uterine instillation.

Clark,[3] and Woelffer[4] have reported favorably on the use of tyrothricin in aqueous solution for uterine infections in cows, and we, too, have found this to be of value. This antibiotic substance is quite stable under most circumstances.

In the search for more satisfactory agents for use in the treatment of uterine infections, hexylresorcinol was considered because of its spectrum of antibacterial activity. An oil preparation was considered desirable in order to prevent rapid absorption of the chemotherapeutic agent that it may contain. Hexylresorcinol in the form of caprokol oil® was selected, since it contains 2.5% of the compound in a bland oil. One hundred to 120 cc. of caprokol oil was administered directly into the uterus, using a metal inseminating tube and syringe. There is no difficulty encountered in passing the inseminating tube through the cervix when the cow is in heat; however, care and precaution must be used when passing the tube through the cervix during the anestrual period. The animals in this study were not treated at the time of estrus because it was believed that the injected material would be expelled too quickly and thus treatment would be ineffective. They were treated during the anestrus period. They were not bred in the first succeeding heat period, but usually during the second estrual period following therapy.

Table 1 contains data with respect to 305 cows in 52 herds that are included in this clinical study. In some herds only one animal was treated, while in other herds as many as 30

®Caprokol oil used in this study was prepared by Sharp & Dohme, Inc., Philadelphia, Pa.

animals were treated in the period of this investigation, which was three years.

In 38 herds, a diagnosis of endometritis and cervicitis was made in 198 animals, each of which received one treatment with caprokol oil. Of these animals, 191, or 96.4%, improved and conceived on first or second breeding subsequent to treatment, while 7, or 3.6%, failed to conceive following treatment. These latter animals were sold as non-profitable animals and were slaughtered.

TABLE 1. Summary of Cows Treated with Caprokol Oil

No. of Herds	No. of Cows	Diagnosis	Treated Once	Treated Twice	Results Good	Results Poor
38	198	Endometritis Cervicitis	198	—	191	7
10	95	Endometritis Cervicitis	56	39	83	12
4	12	Pyometritis	—	12†	12	0

†These animals also received other therapy.

In 10 herds, 95 animals showing signs of endometritis and cervicitis were identified. The condition appeared more severe than in the above-referred group. Of these 95, 56 received only one treatment, while 39 received two treatments. The second treatment usually was given about 14 to 21 days after the first. Abnormal findings on re-examination and inspection of the animal prompted the decision for a second treatment. Of these 95 animals, 83, or 89.5%, made good recoveries, while unsatisfactory results were obtained in 12, or 10.5%.

In 4 herds, 12 cases of pyometritis were treated. Each animal was injected with 120 cc. of the hexylresorcinol in oil in the uterus. An intramuscular injection of 30 to 50 mg. of stilbestrol was also given. Most of the patients had three such intrauterine treatments at daily intervals or intervals of several days. It is believed that the combined therapy was helpful in bringing about favorable response. Although 12 cases are an insignificant number on which to draw conclusions, since the reports were compiled during the time that the other data were collected, they are considered to be of interest.

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Editor's Note

According to a report by Dr. Josephine Deubler at the Southern Veterinary Medical Association Meeting, Baltimore, Md., October 22-24, 1951, hexylresorcinol in oil (caprokol® oil) has been found useful in the treatment of endocervicitis in mares. Satisfactory response was obtained in 37 out of 41 mares by the intrauterine administration of 4 oz. of the preparation.

▼ ▼ ▼

Suppurative Proventriculitis in Chickens

WADE M. SMITH, JR., D.V.M., Des Moines, Iowa

Three birds from a farm flock near Des Moines, Iowa, were presented for autopsy. The history was that a few birds at a time out of the flock of 350 seven-month-old pullets became droopy and pale, then began losing weight. Death loss was low, never exceeding 3% per month, but about 10% were noticeably affected. The flock owner had noticed the symptoms for about 2½ months.

On autopsy, all three birds showed evidence of proventriculitis; one was apparently in the acute stage, with the proventricular wall thickened, and showing diffuse interstitial hemorrhage. The other two proventriculi had thin, atonic walls, and the proventricular glands were filled with suppurative exudate.

All three birds showed acute catarrhal enteritis, grossly resembling coccidiosis, but repeated scrapings from the intestines of all three were negative for Coccidia. One of the birds with atonic proventriculi was affected with hepatic lymphomatosis. The ceca of one bird was filled with a frothy, tan material that was acid to litumus. Cecal worms were present.

A diagnosis of proventriculitis, enteritis, and visceral lymphomatosis was returned.

In view of the enteritis in the absence of Coccidia, copper sulfate 1:2,000 was prescribed as an antiseptic astringent. A series of two three-day treatments with four intervening days untreated was prescribed. Two weeks after completion of treatment, birds had improved, production increased, and the death loss dropped to one bird during the last week of observation.

▼ ▼ ▼

Though brucellosis may be induced by intrauterine infusion of virulent organisms, there is no evidence that bulls can transmit the disease by natural service.—*C. A. Manthei, D.V.M.*

VETERINARY ITEMS OF INTEREST

Acquaintance with the normal makes the abnormal apparent.

▼

Continued traction on a fetus in cases of dystocia, a common practice of farmers or herdsmen, is the poorest kind of obstetrics.

▼

It is good practice to supplement other therapy by giving glucose by mouth in one form or another to assist in relieving symptoms of acetonemia.

▼

Sound management practices, including feeding, housing, and considerate milking methods, are essential to successful mastitis therapy.

▼

Edematous gall bladder is a near-constant postmortem finding in dogs who have died of infectious hepatitis.

▼

Respiratory disease in dogs due to a virus unrelated to other canine viruses is under study at the Cornell Research Laboratories.

▼

Biological research requires disease-free animals to assure correct interpretation of results of experiments. Such disease-free animals are as vital to success as clean glassware is to the chemist or bacteriologist.

▼

Three kittens only a few hours of age exhibited signs of fear when a puppy was held toward them. Dr. E. P. Guthrie, psychologist of the University of Washington, suggests that this indicates that cats are born with an inherent fear of dogs.

▼

Aside from the demand for veterinary service in the field of bovine infertility, such practice is interesting and remunerative for the practitioner who will apply his training to the study of factors that influence breeding efficiency of the modern dairy cow.

Experimental trials have indicated a superadditive effect from combining tyrothricin and bacitracin.

▼

The average gross income of families in Greece practically doubled following malaria control programs instituted under WHO sponsorship.

▼

An accurate diagnosis by qualified pathologists of tumors which are surgically removed will assist the veterinary surgeon in evaluating other tumorous growths referred for treatment.

▼

Increased consumer demand for broilers is resulting in continual expansion in broiler production. An all-time record production of more than 700,000,000 birds in 1951 is anticipated.

▼

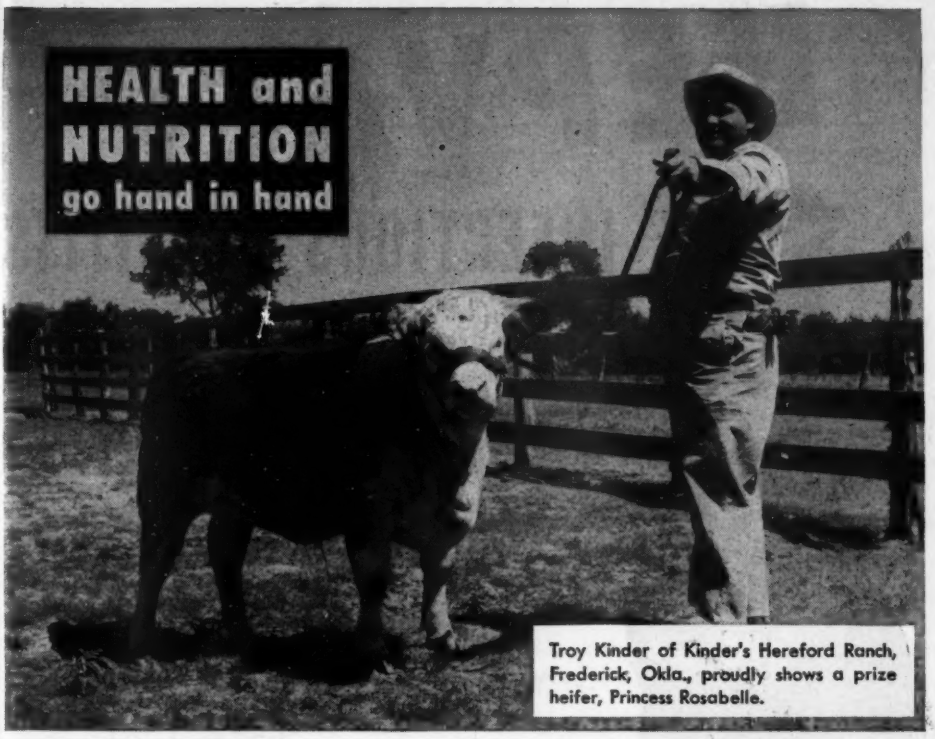
Speaking in reference to resistance of cattle to Brucella infection, Dr. C. A. Mathei stated that experimental evidence indicates that animals vaccinated as calves with strain 19 show no decrease in resistance with increase in age.

▼

The international tuberculosis campaign, undertaken as a world-wide research project by the WHO tuberculosis office in Copenhagen, announces that 37,000,000 children in 24 countries on five continents have been tuberculin-tested and 16,000,000 vaccinated with BCG since the program was initiated at the close of World War II.

▼

Although always vital to the health of our nation, veterinary medicine takes on even more significance in times of emergency. Waste in this period of mobilization, even when unintentional, sabotages defense work. Veterinarians and growers have made notable progress in fighting livestock diseases and parasites, but we still waste hundreds of millions of dollars' worth of valuable food products because of the ravages of infectious diseases and parasites.—*Howard A. Rush, M. D., in The New York Times.*



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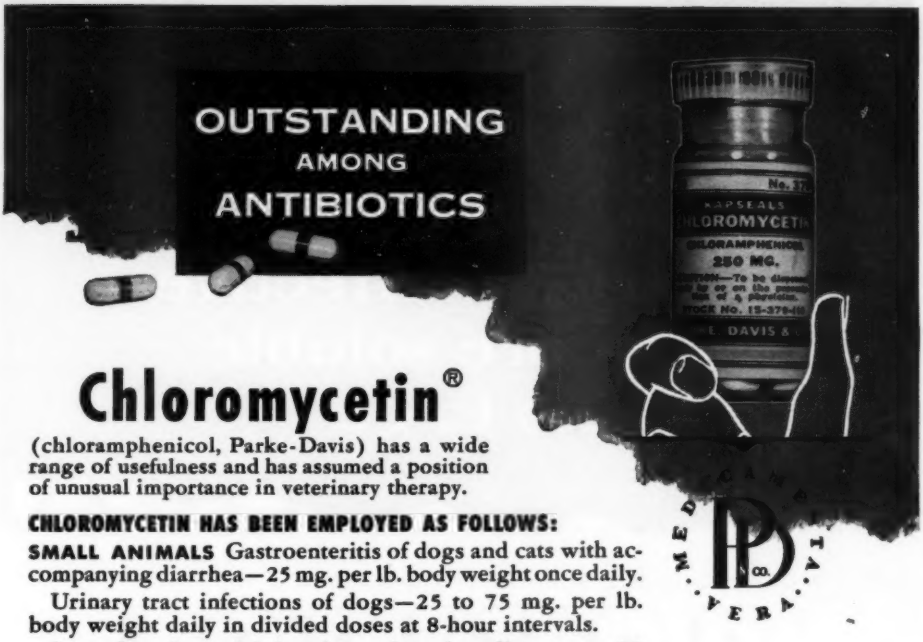

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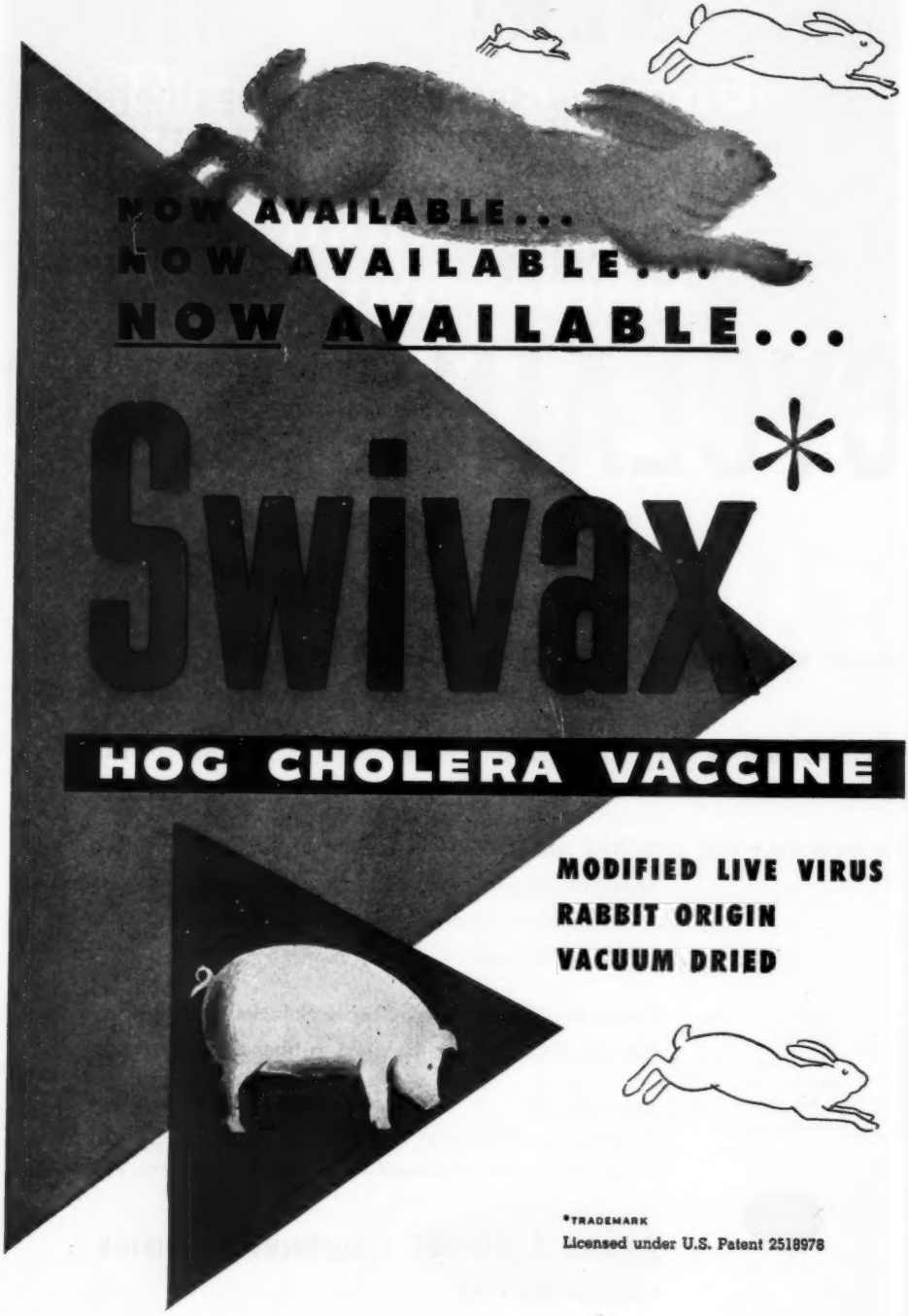
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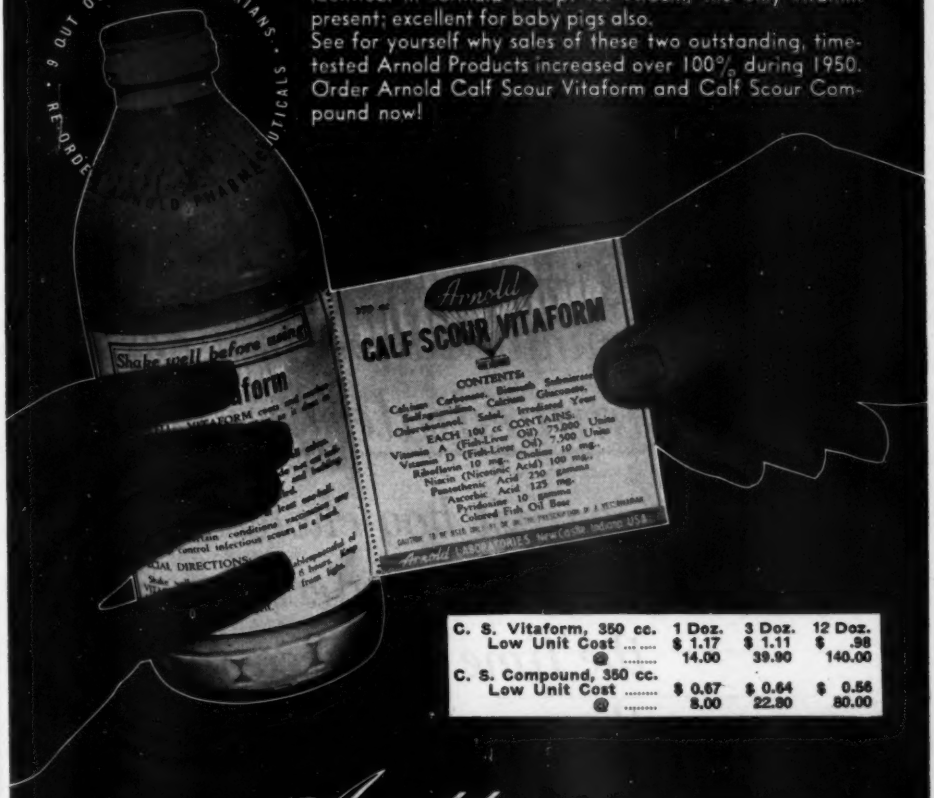
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Highly emulsified to supply vegetable oil of desirably small particle size in aqueous dispersion.

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...for the treatment of retained placenta, metritis and pyometra

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How Supplied: In boxes of 3 Utercaps that bear tear label and full instructions. Four boxes of 3 in cardboard shipper.

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Many hopeless cases have responded amazingly to treatment with Physotropin. Acting as a cholinesterase inhibitor, Physotropin relieves pain due to muscle spasm. It has been reported[2] as being used successfully in the following conditions: rheumatoid arthritis, inflammation of spinal cord, invertebral and cervical disc injury, atrophy of muscles following injury, myositis, ventricular dropsy, and as routine following fracture repairs.

Used in solution for immediate results and in tablet form as a maintenance dose. Try it in the next case where it is applicable.

1. Fittipaldi, S. A. and DeCamp, D., Vet. Med., November 1950.
2. Ibid.

Tablet containing:
Physostigmine Salicylate 0.5 mg (1/120 gr.)
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Sterile, isotonic solution containing:
Physostigmine Salicylate 1.0 mg per cc.
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You've used it for years for orphaned puppies and ailing dogs

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Just look at this list of ingredients! Compare it with the food you are now feeding!

Vitamin Guarantee 2000 U.S.P. units Vitamin A, 450 U.S.P. units Vitamin D, 1.0 mg. Thiamine, 6.0 mg. Riboflavin, and 20 mg. Niacin per pound.

GUARANTEED ANALYSIS

Crude Protein, not less than	**25.00%**
Crude Fat, not less than	**5.50%**
Crude Fiber, not more than	**5.00%**
Ash, not more than	**12.00%**
Moisture, not more than	**9.00%**
Nitrogen-free Extract, not less than	**40.00%**

INGREDIENTS: Meat Meal, Flaked Corn, Soybean Oil Meal, Corn Germ Meal, Flaked Wheat, Fish Meal, Fish Liver and Glandular Meal, Dried Whey Solubles, Rice Polishings, Dried Beet Pulp, Dehydrated Cheese, Animal Liver Meal, Ice Cream Cone Meal, Wheat Germ Meal, Vitamins A and D Feeding Oil, Thiamine, Niacin, Riboflavin, Crude Betaine Fraction of Beet Juice, Brewers Dried Yeast, Tricalcium Phosphate, Soybean Lecithin, Vitamin B_{12} Supplement.

Plus these vital Esbilac ingredients

INGREDIENTS: Cocoanut Oil, Cottonseed Oil, Dried Skim Milk, Alkaline Caseinate, Creamery Butter, Lactalbumin, Dried Egg Yolk, Vitamin and Mineral Mixture, consisting of Vitamin A Feeding Oil, Vitamin D (Irradiated Ergosterol), Riboflavin, Ferric Ammonium Citrate, Potassium Phosphate Monobasic, Potassium Phosphate Diabastic, Calcium Carbonate, Magnesium Carbonate, Magnesium Sulphate, Sodium Chloride, Potassium Chloride, Potassium Iodide, Manganese Sulphate, Aluminum Potassium Sulphate, Copper Sulphate, Sodium Fluoride.

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a combined sulfa therapy

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Completely Balanced

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more assimilable
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LOOK! Completely uniform. It's Homogenized. No separation of ingredients. No "fines"—no flakes.
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MEAL
"Nourishes EVERY INCH of a Dog"

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Now HOMOGENIZED!

A Product of General Foods

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Here's how the Associated Serum Producers public relations campaign is helping your practice. Now in its 17th year, this nation-wide effort is building greater demand for the veterinarian's services in 8 ways — through:

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*Rose, H. T.: The Use of Bacitracin in Small Animal Medicine, J. Am. Vet. M.A. *117*:306 (Oct.) 1950.

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New Grade Standards for Slaughter Hogs and Carcasses Proposed

The U. S. Department of Agriculture has invited comment and views on a proposal to establish new federal grade standards for slaughter (live) barrows and gilts and for barrow and gilt carcasses. Comments on this proposal, which is aimed at bringing hog standards in line with present consumer preferences for pork products, should be filed with the Department before April 3, 1952.

The proposals are the result of several years of research and would supplant tentative standards for live hogs and establish for the first time standards for carcasses.

These new grade standards can be used to recognize and identify hogs of various degrees of fatness and quality. Their use in hog marketing would not necessarily mean that more money would or should be paid for all hogs. The grades should enable a more equitable distribution of money paid for hogs.

The grades for slaughter barrows and gilts and their corresponding carcasses are summarized as follows:

Choice No. 1. Slaughter hogs with about the minimum finish required to produce high quality pork cuts. Carcasses have a relatively high ratio of lean to fat and usually yield about 50% of their carcass weight in the four lean cuts of hams, loins, picnics, and Boston butts.

Choice No. 2. Slaughter hogs producing high quality pork but because they are slightly overfat, cuts from these carcasses require somewhat heavier trimming. Carcasses usually yield about 45 to 48% of their carcass weight in trimmed loins, hams, picnics, and Boston butts.

Choice No. 3. Slaughter hogs producing high quality pork but decidedly overfat Carcasses yield a somewhat low proportion of lean cuts and a high proportion of fat cuts. These carcasses normally yield less than 45% of their weight in the four lean cuts.

Medium. Slaughter hogs which are slightly underfinished and as a result produce flabby and slightly soft cuts with little marbling. These cuts are of medium quality. The yield of lean cuts is proportionately high but the ratio of total lean and fat to bone is slightly low.

Cull. Hogs of this grade are decidedly underfinished and, although they produce carcasses with a high ratio of lean to fat, the cuts are very inferior in quality and are suitable only for use in processed meats.

▼ ▼ ▼

Ketone bodies are normal products of fat metabolism. Only in excess (ketosis) are they harmful. Ketones may be largely responsible for diabetic coma in man.

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The addition of antibiotics to semen has been chiefly responsible for success attained by artificial insemination organizations. Aqueous solutions of penicillin and streptomycin do not influence longevity of spermatozoa but have been beneficial by limiting bacterial growth in diluted semen.

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The original triple sulfa, parenteral solution for veterinary use.

2 grains total sulfa per cc, as sodium salts of Sulfathiazole 6%, Sulfapyridine 4% and Sulfamerazine 3%, buffered to a pH neutral with respect to blood.

Treatment of choice in pneumonia, shipping fever, necrophorus infections and a wide range of other bacterial infections.

250 cc.	$1.65	6-250 cc.	9.00
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Sterile Solution

SODIUM SULFAMERAZINE 5% AND SODIUM SULFAMETHAZINE 5%

Promptly combats
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MERAMETH® *Sterile Solution* is administered by intravenous or intraperitoneal injection. It may be administered also by intramammary infusion for treatment of mastitis.

Supplied: No. 2324—250-cc. and 500-cc. rubber-capped bottles.

Dispensed only by or on the prescription of a veterinarian.

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Postpartum sexual rest of 120 to 180 days is advisable, especially in high milk-producing cows.—*M. G. Fincher, D.V.M.*

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Closure of operative wounds after surgical removal of tumors is the most important feature of this operative technic.—*Joseph Millar, D.V.M.*

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When the economic aspects of acetonemia in dairy cows are considered, one wonders why this disease has not received even more attention of research groups.

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Smoother
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Compounded under the direction of veterinarians of exceptional experience. Highly recommended by leading herdsmen as the best treatment for the purpose.

Also mfrs. of LIQUID Dairmol Antiseptic and Deodorant.

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23rd and Locust Sts. PHILADELPHIA 3, PA.

An appropriation of money for completion and equipment of the new building of the School of Veterinary Medicine, University of Georgia, Athens, is announced by Dean Thomas J. Jones. By recommendation of the Governor and Board of Regents, $550,000. have been set aside for this purpose, which will assure realization of the originally planned facility. This expression of confidence in the potential value of veterinarians in the livestock economy of Georgia and the South generally reflects favorably on those responsible for the administration of this training center.

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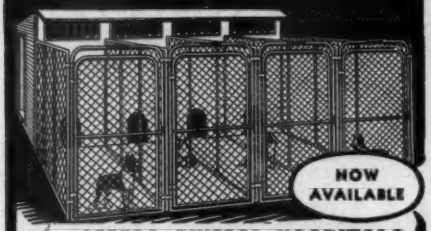

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Loss of body weight, lessened milk production, and loss of breeding efficiency are important economic aspects of acetonemia.—*Jesse Sampson, D.V.M.*

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Foot Rot Ointment effects a virtual chemical debridement of infected areas. Two to three applications of the Ointment are usually sufficient in necrobacillary infections. Thus Foot Rot Ointment saves time in treating foul hoof in cattle and foot rot in sheep.

Foot Rot Ointment contains sulphuric acid, iodine, pyoktanin blue and alcohols in a specially treated petrolatum base.

Foot Rot Ointment is available in:

4 oz. jars.....per dozen $ 6.25
1 lb. jars.....each $ 1.50
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Foot Rot Ointment is one of the Veterinary Pharmaceuticals manufactured by Goshen Laboratories, Inc. In addition to the products manufactured, Goshen Laboratories, Inc. acts as Sole Agent for the Veterinary Specialties of many leading pharmaceutical companies.

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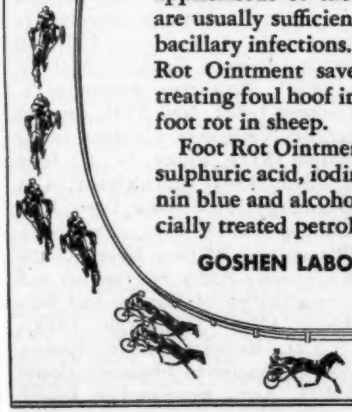

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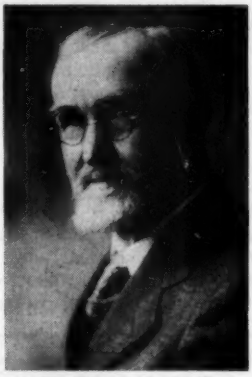
February 16, 1951, the career of Dr. George Craig Faville was closed by death in his 95th year at his home in Emporia, Va. Remarkable as is a life that extends to the advanced age of 95, far more unusual is a professional veterinary career of 71 years, a period attained, it is thought, by but one other college-trained, American veterinarian. One and possibly two of the self-taught, pioneer veterinarians exceeded this period slightly.

Doctor Faville's professional career was not only of great length, but was distinguished by many achievements. Born at Mitchell, Iowa,



Dr. George C. Faville

November 24, 1856, he was graduated from the Veterinary Division of the Iowa State College in 1880. He already held the degree of B. Sc. in agriculture from the same institution. The class of 1880 was the first graduated by the Veterinary Division and numbered but three. Thus, in time, Doctor Faville's career is co-extensive with that of the oldest veterinary college in the United States. When he entered the profession, the leaders in this country were graduates of foreign schools. He was a contemporary of W. Henry Lillyman (London 1840), Boston; Lachlan McLean (Edinburgh 1854), Brooklyn; Alexander F. Liautard (Touloose 1856), New York, founder of the American Veterinary College; James Law (Edinburgh 1857), Ithaca, N. Y.; John Gadsden (London 1858), Philadelphia; Alex Lockhart (Edinburgh 1865), New York; John Casewell (London 1871), first state veterinarian of Illinois; and William Henry Going (London 1870), early Army veterinarian and second state veterinarian of Kansas; and Benjamin McInnes (New Edinburgh 1874), Charleston, S. Car. In years in the profession, Doctor Faville was senior to Frederick Foster (Glasgow 1881), Army veterinarian; Joseph

Hughes (Glasgow 1882), founder of the Chicago Veterinary College; Rush Shippen Huidikoper (Alfort 1884), first dean of the University of Pennsylvania, School of Veterinary Medicine; W. H. Dalrymple (Glasgow 1885), pioneer veterinary educator of the South; and Albert Hassal (London 1886), BAI Zoological Laboratory, to mention only nationally known veterinarians. Among the leaders of the next generation of veterinarians, graduates of American schools, Faville had a prominent part.

Immediately following graduation, Doctor Faville began practice at Danville, Ky., but soon accepted an appointment as Professor of Veterinary Science and Zoology at the Colorado Agricultural College. When the outbreak of what was at first believed to be foot-and-mouth disease occurred in cattle near Neosho Falls, Kans. (in March 1884), Faville was sent to the scene by the governor of Colorado. Great excitement was caused by this report of foot-and-mouth disease in what was then the interior range country; following as it did soon after a genuine outbreak of the disease in Maine. The Treasury Department, then in charge of animal quarantines, was roundly denounced for inefficiency by newspapers in every part of the country. Many veterinarians were sent to Woodson County at once to advise state government as to necessary action. A number of veterinarians, of whom Professor McEachron of Montreal, Canada, was the most prominent, pronounced the ailment foot-and-mouth disease. Others, including Dr. D. E. Salmon, Chief of the BAI, Prof. James Law, Prof. M. Stalker, Dr. John Casewell and Doctor Faville, held an opposite view. It happened that Faville's report was the first to reach his state government and the newspapers. In a day he became the most widely publicized veterinarian in the country. Professor Law, Casewell and Trumbower diagnosed the ailment as ergotism and Doctor Salmon concurred, making it official. Many arguments ensued in the news press and some in the veterinary magazines of that day. No agreement was reached then or later, except that the ailment was not foot-and-mouth disease. The condition observed then prevails to this day in Kansas, Oklahoma, and the Texas Panhandle and is variously known as wheat poisoning, allergy, ergot poisoning and other uncertain names.

As a reward for his part in the diagnosis, the governor of Colorado appointed Faville state veterinarian, he being the first to hold that office in Colorado. To show his confidence in Dr. A. A. Holcombe, an Army veterinarian who first diagnosed the outbreak as

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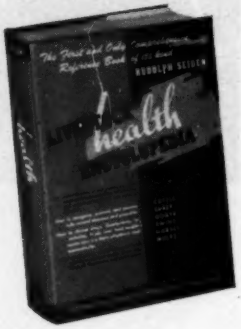

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foot-and-mouth disease, Governor Glick of Kansas appointed him state veterinarian of Kansas and he became the first to hold that office in that state. James Hopkins of Cheyenne, Wyo., visited the scene of the outbreak on the order of the territorial governor and held the ailment to be malnutrition. He returned to Wyoming to become territorial veterinarian—the first.

Dr. John Casewell and Dr. M. R. Trumbower visited the outbreak for the Illinois livestock commissioners. Not long afterward, the governor discharged State Veterinarian Paaren and appointed Casewell in his stead, who, in turn, was later succeeded by Trumbower. M. Stalker, Professor of Veterinary Science and head of the Veterinary Division of Iowa State College, returned to Iowa and the position of state veterinarian and a place on the state board of health. This outbreak of disease in Kansas may have been responsible for creation of the office of state veterinarian in Nebraska and Tennessee also since the first incumbents of those offices made the journey to Kansas and investigated the disease.

Three years later, Doctor Faville read in the morning paper his office had been declared vacant. No reason for the action was given, no bother to ask for his resignation. It was just routine owing to a change in the political administration. Doctor Faville received an appointment in the BAI in April 1887 and was assigned to Chicago. He was transferred to Washington in August, to Baltimore in September, and to Norfolk, Va., as Inspector-in-Charge, January 1, 1894. At this post his principal duty consisted in inspection of export cattle. His tour of duty at Norfolk, which extended till 1912, was thrice interrupted by details to explore the western plains and locate and mark water holes and grazing grounds for cattle trailed from Texas to Montana. In this work he made three trips from Texas to Montana and back to Texas on horseback—altogether possibly 8,000 miles.

During the first 20 years of his professional career, Doctor Faville was a frequent contributor to the pages of veterinary periodicals, and often appeared on programs of the United States Veterinary Medical Association and other veterinary meetings. He was one of the organizers of the Virginia State Veterinary Medical Association and a co-author of the state's first law regulating veterinary practice. While he was state veterinarian of Colorado, Doctor Faville acted as secretary of a group that issued a call for a meeting at Chicago in November 1885 which became the "National

(*Continued on page XXX*)

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Snyder, R. C. and Skelley, J. F.: University of Pennsylvania Veterinary Extension Quarterly No. 123, 1951.

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Proper closure of the surgical wound is the most important phase of the operative technic in the removal of mammary tumors in the bitch.—*Joseph Millar,* D.V.M.

▼ ▼ ▼

Acetonemia in cows deserves more attention of investigators than it has received.

(*Continued from page XXVIII*)

Veterinary and Sanitary Association of the United States", a predecessor of the U. S. Livestock Sanitary Association. Its principal interest was the eradication of contagious pleuropneumonia of cattle and when that goal was in sight the Association languished.

In 1912 Doctor Faville resigned from the BAI and began practice at Emporia, Va., which he continued for 34 years with two interruptions; one to teach at Hampton Institute (1916-24) and the other to engage, whole time, in tuberculin testing for the State of Virginia (1927-34). In 1946, at the age of 90 he retired from practice. Mrs. Faville, a college classmate, died in the following year. He became a member of the Masonic Lodge in 1888, held many offices in the organization, and in 1938 became an honorary life member.

Doctor Faville maintained his faculties and his interest in veterinary medicine till his last illness. He frequently went on calls with his successor and was a subscriber to several veterinary publications at the time of his death. He is survived by a daughter, Miss Edith; a son, George C., Jr.; a brother; a granddaughter and four great-grandchildren.—*D.M.C.*

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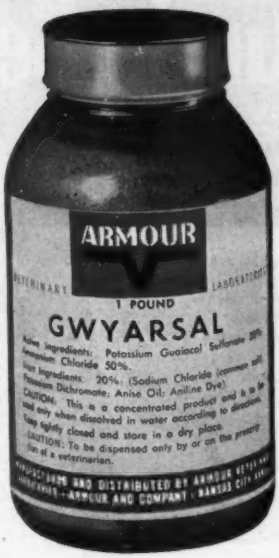

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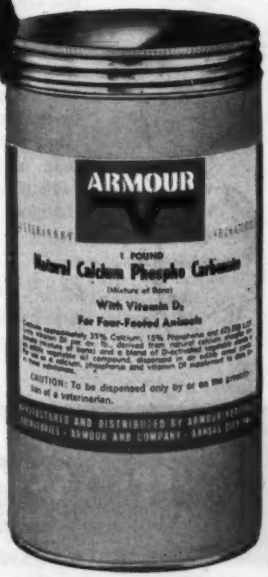

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The book outlines the barriers to medical progress that have been promulgated by various anti-medical research groups, and describes the ways in which these barriers have been broken down through the program of the National Society for Medical Research.

Copies of the booklet may be obtained from the Society's headquarters, 185 N. Wabash Ave., Chicago 1, Ill.

▼ ▼ ▼

Acetonemia is responsible for loss by reduction in milk production (often 50% decrease), body weight loss, and loss of breeding efficiency.—*Jesse Sampson,* D.V.M.

▼ ▼ ▼

COMING MEETINGS

Southwest Missouri Veterinary Medical Association. Annual fall meeting. Country Club, Carthage, Nov. 21, 1951.

Animal Care Panel. Annual national meeting. Thorne Hall, Chicago. Campus of Northwestern University, Chicago, Nov. 29-30, 1951. Bennett J. Cohen, Medical School, Ward Memorial Bldg., 303 E. Chicago Ave., Chicago, secretary.

University of Kentucky. Short course and conference for veterinarians. Animal Pathology Building, University of Kentucky, Lexington, Dec. 5-6, 1951. T. J. Stearns, Live Stock Exchange Building, Room 114, Bourbon Stockyards, Louisville, secretary.

American Association for the Advancement of Science. Annual meeting. Convention Hall, adjacent to the University of Pennsylvania, School of Medicine, Philadelphia, Dec. 26-31, 1951. R. L. Taylor, 1515 Massachusetts Ave., N.W., Washington 5, D. C., assistant administrative secretary.

Ohio State Veterinary Medical Association. Annual meeting. Deshler-Wallick Hotel, Columbus, Jan. 2-4, 1952. Fred J. Kingma, Ohio State University, Columbus, secretary.

Oklahoma Veterinary Medical Association. Annual winter meeting. Mayo Hotel, Tulsa, Jan. 7-8, 1952. Lewis H. Moe, 1736 W. Third Ave., Stillwater, secretary.

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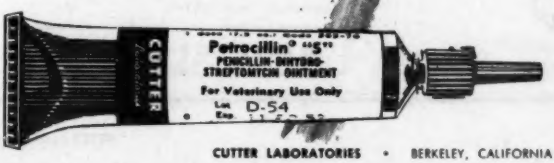

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University of Pennsylvania. Annual conference of veterinarians. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Jan. 7-8, 1952. R. A. Kelser, Dean.

Wisconsin Veterinary Medical Association. Annual meeting. Schroeder Hotel, Milwaukee, Jan. 8-10, 1952. B. A. Beach, Genetics Bldg., Madison, secretary.

New York State Veterinary College. Annual conference for veterinarians. New York State Veterinary College, Cornell University, Ithaca, Jan. 9-11, 1952. W. A. Hagan, dean.

Tennessee Veterinary Medical Association. Annual meeting. Reed House, Chattanooga, Jan. 14-15, 1952. H. W. Hayes, 734 Broadway North East, Knoxville, secretary.

Kansas Veterinary Medical Association. Annual meeting; joint meeting with Missouri association. New Town House Hotel, Kansas City, Kans., Jan. 14-16, 1952. Olin W. Morris, Parsons, secretary.

Minnesota State Veterinary Medical Society. Annual meeting. St. Paul Hotel, St. Paul; Jan. 14-16, 1952. B. S. Pomeroy, University Farm, St. Paul 1, secretary-treasurer.

Missouri Veterinary Medical Association. Annual meeting; joint meeting with Kansas association. New Town House Hotel, Kansas City, Kans., Jan. 14-16, 1952. J. L. Wells, Box 676, Kansas City, Mo., secretary.

Iowa Veterinary Medical Association. Annual meeting. Fort Des Moines Hotel, Des Moines, Jan. 16-18, 1952. F. B. Young, Box 6, Waukee, secretary.

Intermountain Veterinary Medical Association. Annual meeting. Newhouse Hotel, Salt Lake City, Utah, Jan. 21-23, 1952. M. L. Miner, Veterinary Science Department, Utah State Agricultural College, Logan, secretary.

Michigan State College. Annual postgraduate conference for veterinarians. Michigan State College, School of Veterinary Medicine, East Lansing, Jan. 23-24, 1952. C. F. Clark, dean.

Illinois State Veterinary Medical Association. Annual meeting. Hotel Sherman, Chicago, Jan. 23-25, 1952. A. G. Misener, 6448 N. Clark St., Chicago 26, secretary.

Texas, State Veterinary Medical Association of. Annual meeting. Corpus Christi, Jan. 24-26, 1952. E. A. Grist, Box 11, New Braunfels, secretary.

Mississippi State Veterinary Medical Association. Annual meeting. Edgewater Gulf Hotel, Edgewater Park, Jan. 25-26, 1952. John A. Randle, West Point, secretary-treasurer.

California State Veterinary Medical Association. Midwinter conference. School of Veterinary Medicine, Davis, Jan. 28-30, 1952. C. S. Travers, 3004 16th St., San Francisco 2, secretary.

Alabama Polytechnic Institute. Annual conference for veterinarians. Alabama Polytechnic Institute, Auburn, June 5-7, 1952. R. S. Sugg, dean, School of Veterinary Medicine.

American Veterinary Medical Association. Annual meeting. Ambassador Hotel, Atlantic City, N. J., June 23-26, 1952. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., secretary.

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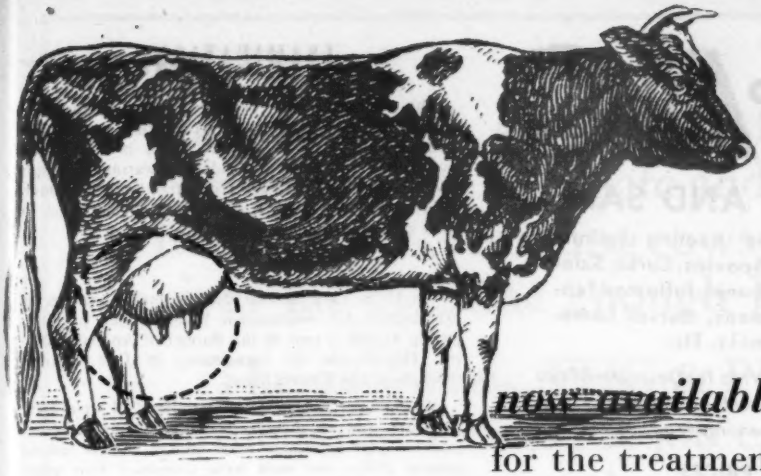

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The California State Personnel Board announces a nationwide examination for veterinarians to be held February 9, 1952, at such locations in the United States as the number of candidates warrants. Applications may be obtained from the State Personnel Board, 1015 L Street, Sacramento 14, and must be filed on or before January 9, 1952.

The U. S. Civil Service Commission announces an examination for veterinarian (trainee) for positions paying $3,100. a year in the Bureau of Animal Industry, Department of Agriculture, at field stations throughout the United States.

Appointment is limited to students of veterinary medicine for on-the-job training during summer months. All applicants must take a written test of general ability and must have completed four years of veterinary medicine in an accredited college or university, one year of which may have been in preveterinary medicine. Applications will be accepted from students who expect to complete the required college study by June 30, 1952. Age limits, which are waived for veterans, are 18 to 35 years.

Further information and application forms may be obtained from most first- and second-class post offices, from Civil Service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications must be filed with the Commission's Washington office not later than November 27, 1951.

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—DEATHS OF VETERINARIANS—

Patrick H. Casey, Farmington, Minn., MC K '11, died July 8, 1951, at the age of 78.

Orin L. DeVore, Billings, Mont., MC K '09, died July 13, 1951, after a long illness. Doctor DeVore had served two terms as sheriff of his community.

Samuel B. Foster, Portland, Ore., WSC '10, died July 25, 1951.

Bernard H. Gibson, London, Ohio, OSU '35, died September 18, 1951. Doctor Gibson and his wife, Kathryn Fisher Gibson, were drowned while on a fishing trip.

Walter E. Grace, Jacksonville, Fla., ONT '03, died August 29, 1951, after a long illness.

Roscoe Clay Griffith, Fort Worth, Tex., CVC '11, died August 27, 1951. Doctor Griffith established the first small animal hospital in Fort Worth.

E. W. Hagyard, Lexington, Ky., died August 15, 1951, at the age of 88. Doctor Hagyard was well known in the racing field for his work with Thoroughbreds.

James M. Kingston, Pittsfield, Mass., UP '12, died August 22, 1951. Doctor Kingston had been associated with the Massachusetts Department of Public Health for a number of years.

Fred W. Loehrke, Logansport, Ind., IND '21, died in August 1951.

Adrian A. Martin, Emmitsburg, Md., USC '18, died November 25, 1950. Doctor Martin had been in general practice in Emmitsburg since 1918.

Seth Henry Rogers, Sidney, Ohio, CIN '09, died August 16, 1951, of a coronary thrombosis.

John E. Sargeant, Pontiac, Ill., CVC '20, died September 16, 1951, as a result of injuries received in an automobile accident.

Franklin Folkenroth Shue, Hanover, Pa., UP '12, died September 17, 1951, at the age of 81. Doctor Shue had been in practice at Hanover since his graduation.

Wilson A. Smith, Rock Valley, Iowa, MC K '07, died July 5, 1951. Doctor Smith was killed in an automobile accident.

B. F. Webster, Winchester, Ill., KCVC '03, died October 3, 1951. Doctor Webster had been engaged in general practice in Winchester since 1906.

Edward A. Wilson, Emmaus, Pa., UP '23, died September 9, 1951, following a heart attack.

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World's BIGGEST Litter — 18 pigs — 4,419 lbs. — in 180 days

18 pigs farrowed—18 raised—a 5th cross Farmers Hybrid litter, sired by a Farmers Hybrid boar. Their dam is a 4th generation Farmers Hybrid gilt. Both gilt and boar are products of Farmers Hybrid Hogs, Hampton, Iowa, the first commercial producers of hybrid hogs.

Dr. Walter R. Anderson is the full time veterinarian in charge of swine husbandry at Farmers Hybrid Hogs. Dr. Anderson insists on sound nutrition. He knows the value of an ample supply of sources of vitamins, calcium, phosphorus, iodine and other trace minerals.

Owned by Jay and David Van Wert, 13 and 14 year old 4-H Club boys of Hampton, Iowa. Their gilt farrowed 18 pigs. The boys raised them, from a birth weight of 47 pounds, to 771½ pounds in 56 days, over a ton in 98 days and to 2¼ tons in 6 months — without losing a pig.

Vitamineral Supplements have been added to the daily feeds of all the breeding stock at Farmers Hybrid Hogs for more than 5 years. This Jay and David Van Wert record breaking litter proves the wisdom of sound nutrition for extra profitable production and reproduction.

Write for the complete story of this record breaking 18 pig, 2¼ ton litter. It is interesting.

Vitamineral Products Co., (Since 1915) Peoria 3, Illinois

SHIPPING FEVER LOSSES

Field results have shown that bacterins give adequate protection to animals when administered at least ten days prior to shipment, sale or exposure. Herd immunity to such infections can be obtained in problem breeding and production herds by routine semi-annual administration of such bacterins to all animals in the herd.

The bacterin of choice should be selected from one of the following, depending upon area complications:

HEMORRHAGIC SEPTICEMIA BACTERIN

100% Pasteurella organisms (for use in all species)

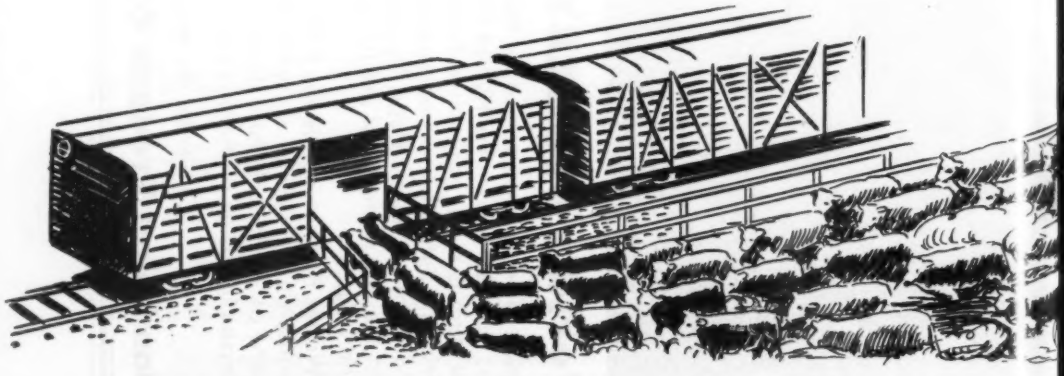
CORYNEBACTERIUM PASTEURELLA BACTERIN

50% Pasteurella boviseptica, Pasteurella aviseptica, Pasteurella oviseptica

50% Corynebacteria of bovine, ovine and swine origin

MIXED BACTERIN BOVINE — FORMULA 1

50% Pasteurella boviseptica
30% Corynebacteria
10% Streptococcus (pyogenic)
10% Staphylococcus albus and aureus (5% of each)



BETTER BIOLOGICALS FOR GRADUATE VETERINARIANS

E RE *Preventable*

HEMORRHAGIC SEPTICEMIA ANTI-SERUM

It is generally recognized that the hemorrhagic septicemia organism plays an important part in the losses incident to shipment of cattle, but many veterinary pathologists believe that filterable virus is often the primary inciting cause of so-called "shipping fever". Because of this possibility, Lockhart Anti-Hemorrhagic Septicemia Serum and Anti-Corynebacterium Pasteurella Serum are produced from mature bovines known to be immune to the various "shipping fevers". In our opinion, this "Plus Value" accounts for the superiority of the results obtained from their use. In those areas where infection by corynebacteria is an important complication, ANTI-CORYNEBACTERIUM PASTEURELLA SERUM (Lockhart) should be used.

ASHE LOCKHART, INC.

800 Woodswether Road Kansas City 6, Missouri

ALIMENTARY DETOXICANT — GASTRIC STIMULANT — MILD LAXATIVE

SCARLET DRENCH

An established dispensing item

Scarlet Drench is compounded of drugs in powder form to be suspended in water and administered as a drench or via stomach tube. It is not a common purge—it's a well balanced combination of detoxicants, stomachics, and laxatives.

indications: digestive upsets characterized by suspended rumination, flatulence, and atony. **dosage:** to mature cattle and horses give one can; for calves and sheep reduce accordingly—use generous amounts of water. **contains:** Gentian, Ginger, Sodium thiosulphate, Organic iodide, Sodium sulphate, Fenugreek, Flaxseed, and Magnesium sulphate.

Supplied in: Ctns. Doz. 12 oz. cans
Ctns. 2 Doz. 12 oz. jars

(Both with dispensing labels)

Quickly Aids Digestive Upsets

Haver-Glover Laboratories

Kansas City, Mo.

for protein deficiency

General Application of Parenamine . . .

Preparative: To improve and protect the nutritional status of the severely malnourished or critically ill patient . . . as fortification against the shock of major surgery.

Reparative: To provide, in ample quantity, the amino acids essential to tissue repair . . . to hasten healing and shorten convalescence.

For use whenever dietary measures are inadequate for correction and maintenance of positive nitrogen balance . . . to replenish depleted body protein stores. Particularly indicated in preoperative and postoperative management, extensive burns, gastro-intestinal obstruction, etc.

Parenamine®

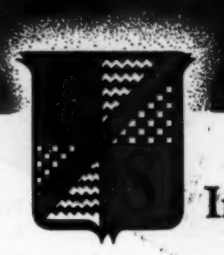
PARENTERAL AMINO ACIDS

Suggested needs for Parenamine in veterinary medicine . . . .

1. Severe gastro-intestinal disease, or persistent vomiting from any cause.
2. Intestinal obstruction, peritonitis or any diseased condition in which the ingestion of food provokes pain or vomiting.
3. Advanced state of inanition (which results from complete lack of food).
4. Chronic ulcerative enterocolitis.
5. Hypoproteinemia due to an actual loss, as in hemorrhage and burns, or to deficient metabolism, as in liver damage.

Supplied in:
15% sterile solution, bottles of 100 cc., rubber capped.

WINTHROP-STEARNS Inc. New York 18, N.Y. WINDSOR, ONT.



Porcine Immunization

Cholera

IV. Its History Not Open to Revision

The once-in-a-lifetime, virus-serum vaccination acclaimed for nearly half a century as a shelter of America's swine herds against cholera does not beg replacement to achieve the desired end.

Whether the objective is dependable insurance against unforeseeable losses, emergency prevention in the face of community outbreaks, or a step toward nation-wide elimination, the ranking *desiterata* are the uniformity, solidity, and duration of the immunity conferred.

THE PATHOLOGY OF AN INVISIBLE CONTAGION AS UBIQUITOUS AND ELUSIVE AS DORSET'S HOG CHOLERA VIRUS DOES NOT LEND ITSELF TO COMPROMISE.

THE

Corn States Serum Company

OMAHA, NEBRASKA